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PERTINENT TOPICS.

G. L. SUTTON,
Director of Agriculture.

"CLOVER SICKNESS."

"Clover sickness" is a term which at one time was conveniently used to describe the failure of clover to grow from any cause, but particularly when the failure occurred on land on which it had previously been grown successfully. In Europe clover of some kind is so fundamental in order to maintain fertility that the total or partial failure of the clover crop is a matter of vital concern to European agriculturists. The problems associated with "clover sickness" were, in consequence, of intense interest some years ago, and remained so until the cause was determined, and consequently the remedy indicated.

In experiments conducted at Rothamstead with this trouble it was found at first that the "clover sickness" was not as bad on plots treated with Phosphatic and Potassic fertilisers as on those treated with other kinds of manure, and it was considered that the trouble was probably due to a deficiency of these mineral constituents of the plant, and especially of potash. Subsequent trials, however, showed that this tentative conclusion was not the correct one, and though there would be clover failures on land where potash or phosphoric acid was in deficient supply, yet failure also occurred where adequate supplies of these were not lacking.

Some kinds of "clover sickness" have been found to be due to the presence of parasitic organisms, but not all kinds, and now it is generally recognised that "clover sicknes" is due to one or more conditions set up by, and consequent upon, the growth of clover on the same land continuously for a number of years.

The clover crop is not unique in that its yield declines after successive crops have been harvested. Most cultivated crops are affected in the same

way. It has become obvious that the growing of any crop continuously, renders the land on which it is grown less suitable for that crop. This lesson was learnt early in connection with some crops, particularly the grain crops, and hence the age-borne lesson that a change in cropping is essential for best results.

When it was realised that clover in common with cereals and other crops also had to have a change, the remedy for "clover sickness" was obvious and at hand. In some places turnips were introduced economically and with success as a change crop after clover. In consequence turnips were said by some to be a cure for "clover sickness." The turnips, however, were only the means to the end. The real remedy was the change of crop, as this gave the land an opportunity to recover from the condition which it had reached as the result of a continuous growth of clover. Fortunately, as did the turnip crop in the case referred to, many other crops will serve the same purpose. In all parts of the Western Australian clover belt it may not be possible to economically grow turnips, and it would, therefore, be an unsound practice to include them in the farming practice as a change crop, and as a remedy for "clover sickness" if it occurred in Western Australia. The oat crop is equally as suitable as turnips for the purpose, as are also rape and barley. It is known that the oat crop is an economic one for our clover country, and it is believed that for many years this will be the main change crop in that part of the State.

As far as I am aware there have not been any cases of "clover sickness" reported amongst the Subterranean Clover crops in the South-West of this State. It is difficult to realise that this trouble will occur on arable land where the clover is treated largely as a crop which, like oats, occupies the land for a restricted, but longer period of several years, and after which the clover sod is broken up to give place to other crops. Provided the clover grown in this way is treated with liberal dressings of superphosphate, or other suitable phosphatic fertiliser, it is not likely to suffer from a deficiency of either phosphoric acid or lime, but as the years go on, and the clover crops are removed by grazing, or as hay, it is expected that it will be necessary to supplement the phosphatic fertilisers with those containing potash. As is very generally known the clover, once established, is not likely to suffer from nitrogen deficiency, and, in consequence, to need the application of nitrogenous fertilisers. The clover plant, in common with other leguminosae, has the power of obtaining from the air sufficient supplies of nitrogen for its own needs, and then, in its residues, leaving in the soil sufficient for the needs of other crops.

Owing to the comparatively recent introduction of Subterranean Clover into our agriculture, and consequent lack of definite information on the point, it is very much more difficult to forecast what is likely to happen to Subterranean Clover when used as a permanent pasture on other than arable land. It seems possible, and at present there is no evidence to the contrary, that under Western Australian conditions it will prove eminently successful in this role, provided its natural enemies can be kept in check, and provided it is suitably fertilised. At the present time this latter requirement involves periodical top-dressing with phosphatic manures, and in the future it may be found that potassic fertilisers are also necessary. This latter point is one that can be determined only by experi-

ment. In this connection the Hon. Minister for Agriculture is desirous that farmers, who are interested in this matter, should co-operate with the Superintendent of Dairying and his staff to obtain the necessary information. He has provided facilities whereby the necessary trials can be carried out on the farmers' holdings.

THE CONTINUED USE OF SUPERPHOSPHATE IN THE CLOVER BELT.

There are some farmers in the clover belt who believe that the continued application of superphosphate is likely to cause the soil to become more acidic, as the result of the depletion of its lime contents. There is, however, no foundation for such a belief. (Lime is a compound of calcium, and, as understood by the farmer, is usually either calcium oxide (quick lime) or calcium carbonate (slaked lime or chalk), the latter form is most commonly applied to the soil at the rate of not less than about ten hundred weight per acre.) Though plants require a small amount of calcium as food, and can obtain it from the lime applied to the soil, lime is not applied to the soil for this purpose, but mainly with the object of correcting acidity or sourness when such is sufficiently pronounced as to prevent the crop making its best growth.

Superphosphate does not contain calcium oxide or calcium carbonate and, therefore, when applied to the soil does not add these calcium compounds to it. Superphosphate, however, contains two other calcium compounds, namely calcium sulphate and calcium phosphate, and from these compounds, contained in the superphosphate, the calcium which the plant needs as food can be obtained just as it can also be obtained from the lime which may be applied to correct acidity.

Superphosphate, however, being an acid fertiliser, does react with some of the carbonate of lime in the soil, but though many experiments have been conducted elsewhere in connection with this matter, there is no evidence to show that the continued application of superphosphate results in making the soil appreciably more acidic.

Farmers in the clover belt and elsewhere may, therefore, continue using superphosphate without fear that their soils will become more acidic because of its continued use, and also with confidence that the calcium compounds in the superphosphate will furnish the calcium needed by the plant for a food.

THE TWO ESSENTIALS FOR MAKING GOOD SILAGE.

The time is at hand when silos are to be filled in readiness for the coming summer. The first essential to ensure success is to cut the crop at the right time. Experiments have shown that the proper time is when the material contains from 66 per cent. to 74 per cent. of moisture. Farmers cannot be expected to determine the moisture content of their crops by analytical methods, nor is it advisable nor needful that they should do so, for the degree of maturity of the cultivated crops is an excellent practical

guide as to the amount of moisture they usually contain, and with the latitude of from 66 per cent. to 74 per cent. such a guide may be regarded as quite satisfactory. With the winter cereals—wheats, oats and barley—commonly grown in this State, the period of full bloom is the proper time to cut them, and with maize or "Indian corn" it is when the kernels are dented and well towards maturity. Experience with the general condition of these crops at the proper stage of ma urity will indicate to the farmer the best time to harvest other crops or plants for the same purpose.

The worst kinds of silage are obtained from the following extreme conditions, viz.:—(a) when the crop is over-ripe or from over-dry material, (b) when the material is immature or excessively wet. These extremes should be avoided and the material must be succulent, but should not be so succulent that the juices will be pressed from them to drain away on being pressed in the silo or stack.

In selecting the stage at which the green stuff is to be cut for silage, it is better to err—if at all—on the side of succulence rather than on that of extreme dryness, for in such cases, provided the crop is not immature, the worst that will happen will be that some of the juices will be pressed out and the food material contained in them lost, but the silage will still be good.

If for any reason the crop becomes too mature or becomes wilted after being cut and before being placed in the silo, its condition and the quality of the resulting silage can be improved by sprinkling the material with water as it is being chaffed and placed in the silo.

The second essential for success is to keep the material during the process of ensilage at a comparatively low temperature—not much above 120 deg. Fahr. This condition is assured by *the exclusion of air*, and the necessity for ensuring this constitutes the *"Golden Rule"* in connection with the making of silage.

At one time the winter cereals were regarded as unsuitable because their stems were hollow and therefore contained large quantities of air, compared with the stems of maize and sorghum, which are solid. These opinions have proved to be ill-founded, for the anticipated difficulties have been overcome, and the exclusion and absence of air facilitated by chaffing, packing, and pressing the greenstuff. Except in the uppermost layers the pressure is provided, in tower silos, by the weight of the material in the silo itself. To ensure the proper packing of the greenstuff, it is important to see that the heavy and light material is evenly distributed throughout the mass, so as to avoid having all the weighty portions in the centre and the light portions—leaves, etc.—on the outside. The proper packing is further aided by tramping the material as it is filled into the silo, and usually is done by one or more persons. More attention is generally paid to tramping the edges rather than the centre. This, it is believed is a mistake, for if the material in the centre is less compact than at the edges it is likely to sink more, with the resulting tendency to draw the material away from the sides, thus admitting air between the walls and the material, and resulting in waste on the outside. The endeavour should therefore be to tramp the surface evenly, but, if anything, less vigorously at the edges than in the centre.

BROOM MILLET COMPETITION.

G. K. BARON-HAY, B.Sc.Agr.,
Assistant Superintendent of Dairying.

Last season the W.A. Brushware Company, Fremantle, generously donated a prize of £5 for the best 1cwt. of Broom Millet fibre received at their factory prior to 30th April. The samples of fibre received demonstrated clearly that prime hurl could be produced in this State. In order, therefore, to further encourage growers in the production of this crop, the management of the factory decided to continue the competition for this season under the same conditions.

Although the past season was most unfavourable to the production of good fibre, some excellent samples were received. The following are the results of the competition:—

——	Quality of Fibre.	Colour of Fibre.	Freedom from Weeds.	Length of Stalks.	Packing.	Total.
Maximum	20	10	10	5	5	50
E. E. Manning, Kelmscott	20	10	10	5	5	50
Cartwright Bros., Wagerup	18	18	9	5	5	45

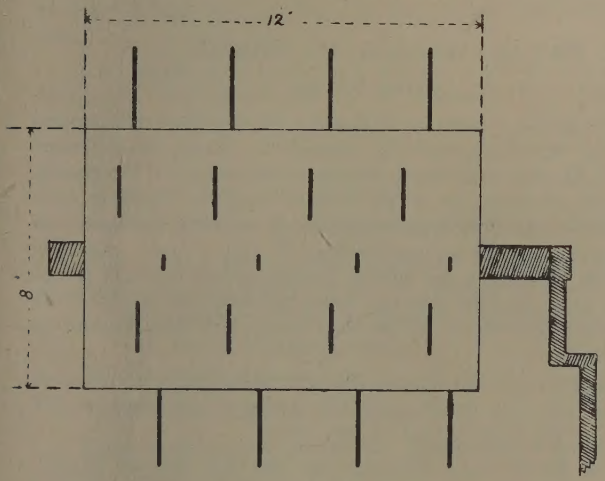
Good samples of fibre were also received from the following growers, though not packed to fulfil the requirements of the competition:—J. M. Riegert, Yarloop; John Grayson, Wagerup; O. E. Titley, Brunswick Junction; and R. Waring, Group 81, Peel Estate.

The winning sample of fibre was prime quality hurl, of good length and colour, and had been very carefully prepared. A consignment of such a sample would sell at a premium of £12 to £13 per ton on the market.

Messrs. Cartright's sample was also of good fibre, though was stained at the tips, probably due to lying in too large heaps before the seed had been removed, which caused sweating.

The price of fibre has ranged from £39 to £50 per ton this season, at which price good returns per acre may be obtained.

All growers interviewed by the writer have complained that it is tedious work removing the seed from the broom heads. Provided the heads are well dried, the seed may be removed very easily by means of a roller, studded with ⅛in. iron studs, either with blunt edges or round. Sharp edges will tear the fibre. The studs should be arranged in rows, three inches apart, and staggered in the rows so that no one nail comes immediately behind the other, as in a tyne cultivator. The roller can be driven by a treadle. (See illustration.)



ROLLER FOR CLEANING SEED

Studs 3 ins.
Eight rows, 3 ins. between studs
"A" Section through stud, showing blunt edge (Enlarged)

Illustration.—Full details as to cultivation are given in the Departmental *Bulletin* No. 201, obtainable by application to the Director of Agriculture, Department of Agriculture, Perth.

"THE JOURNAL OF AGRICULTURE"

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A FATAL DISEASE IN SHEEP.

J. F. FILMER, B.V.Sc.

Inquiries are frequently received (especially during late summer and early winter months) concerning a fatal disease in sheep, which occurs throughout the Wheat Belt and Great Southern Districts. It frequently affects sheep in good condition, but is not confined to these. There is nothing very characteristic about the symptoms; but on opening the sheep the body cavity is found to contain a large quantity of fluid. This is generally the only abnormality noticed by the farmer though usually changes in the liver are present. It is thought that the following short summary of the way in which the fluid accumulates in the body cavity may help farmers to eliminate this disease.

In the great majority of cases fluid in the abdominal cavity means some derangement of the liver. In order to explain this it is necessary to give some slight account of the blood supply of that organ.

The blood which passes to the stomach and intestines through the arteries is distributed to these organs through the capillaries (small vessels). The nutriment which has been extracted from the food is here conveyed to the blood. But this is not carried direct to the heart.

Instead it is carried in the blood to the portal vein which enters the liver, and again splits up into capillaries which ramify through the substance of the liver. These eventually join up and form the hepatic veins which open into one large vein, and through this the blood flows back to the heart.

So it will be seen that in travelling from the heart to the stomach and intestines and back through the liver, the blood must pass through two sets of capillaries.

Now, if there is any derangement of the liver, opposition is offered to the flow of blood through the capillaries of that organ. This causes back pressure and leakage of fluid into the abdominal cavity. This fluid is usually colourless, because the colour of the blood is carried in the red corpuscles or blood cells, and these are retained in the vessels.

Liver derangement in sheep may generally be referred to three causes—

(1) Liver Fluke;
(2) Germs;
(3) Toxins or Poisons.

The first cause fortunately is not present in Western Australia, so need not be considered.

Germ-caused diseases represent too large a field to be dealt with here.

The third is probably the most important cause of liver trouble. Toxins or poisons may be of numerous kinds. It is impossible to attempt a complete classification here. But they comprise amongst others the following four classes:—

(1) What we will somewhat loosely term Chemical Poisons, *e.g.*, Arsenic, Strychnine, Prussic Acid, etc.;
(2) Plant Poisons, *e.g.*, York Road, Box, etc.;
(3) Food Poisons;
(4) Body Poisons.

The first two classes cause symptoms which may be more or less easily recognised, and are not likely to have caused the condition under discussion.

The fourth class is of some interest. All the organs of the body are continually undergoing wear. The process of this wear is thrown off in waste products which are often of toxic nature. These are eliminated by the bowels, kidneys, skin, and lungs. If, however, the process of elimination is interferred with, the toxins are absorbed into the blood and an autointoxication results. This result is most likely to happen in sheep when there is a lack of green feed and the kidneys and bowels, as a result, become sluggish.

Food poisons are not easily explained. When food causes injury to the digestive system, it may generally be referred to one or more causes—

(1) Spoiling of food by disease or fermentation, *e.g.,* Musty Chaff;

(2) Physical Characteristics;

(3) Badly Balanced Diet.

The first needs little or no comment.

The second is more important. The digestive organs of sheep are extremely efficient, but they are sometimes sorely taxed at the end of a long summer when sheep are turned on to harsh stubble or sand plain.

Badly Balanced Diet is, however, perhaps the worst offender. Bad balance may be brought about in two ways—

(1) Absence or lack of some ingredient;

(2) Excess of some ingredient.

(1) The ingredient which is generally lacking is green feed. I firmly believe that sheep graziers will need to counteract this either by growth of summer crops or by use of ensilage.

(2) The ingredient which I think is generally given in excess is protein. Asking a sheep to live on nothing but oats, bran, and linseed nuts is like putting a man on a diet of nothing but meat. This should be corrected by giving chaff, or better still, ensilage with the concentrates.

To sum up, Fluid in the body cavity is caused by liver trouble. Liver trouble is generally caused in this State by improper diet. The remedy is in the hands of the farmers.

CRINKLE OF ORANGES.

W. M. CARNE,
Economic Botanist and Plant Pathologist.

The term "Crinkle" is applied to the development of irregular depressions of the surface of oranges, particularly navels, running more or less at right angles to the length of the fruit (see illustration). Crinkled oranges have a puffy feeling when picked, quite distinct from the firm turgid feeling of normal oranges.

Crinkle develops while the fruit is on the trees. It is readily distinguished from the longitudinal corrugations frequently found on navel oranges of an inferior type. Such corrugations are characteristic of types of fruit, and the tendency to form them is transmitted through buds taken from trees with fruit of this type. Crinkle on the other hand is a disorganisation related to irregularity of water supplies duding the summer and autumn, and is common only in occasional years.

If orange trees make good growth during the first half of the summer and are then subjected to drought conditions, the fruit ceases to grow or grows very slowly. If the drought period has been sufficiently long and is followed by heavy rains or heavy irrigation the swelling of the juice cells in the quarters of the fruit may be so rapid that the rind and rag cannot expand fast enough. The consequence is that both tend to break, and split oranges result. Where, however, the drought period has not been so prolonged, or when light rains or light irrigations follow the drought, the strain resulting from the swelling cells of the quarters may be only enough to break the rag and not the rind. The rag then becomes more or less cracked, and with the growth of the rind the latter tends to collapse into the cracks, forming crinkles. Such conditions occurred this year. The dry period commencing in February was broken by the light rains of 7th and 9th May, before the heavy rains set in on 21st. The result was that while split fruit were not uncommon in orchards which had become very dry, crinkled navels were common where the soil had not become so dry.

Crinkled oranges are very liable to attack by blue and blue-green moulds. When subjected to pressure in picking, in packing, and in handling the packed cases, splits, usually minute, are very liable to develop in the crinkles.

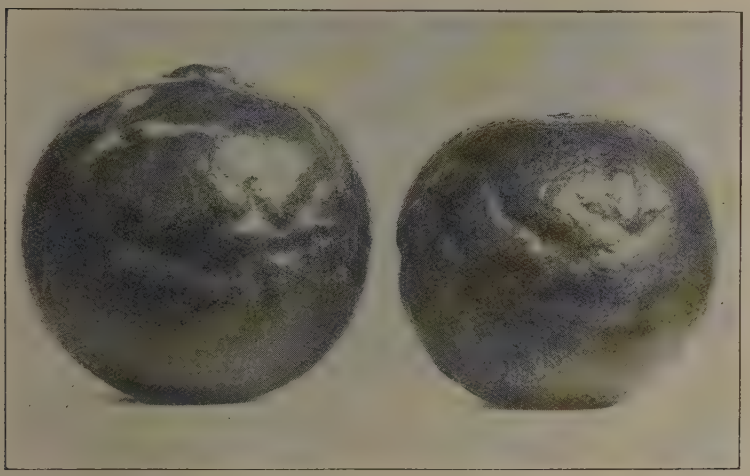
Once a crack has developed mould attack is almost certain, especially under our conditions owing to the high humidity normal during May to August (the picking season for navels), Crinkled navels picked during unusually dry periods in these months are less liable to mould than when the humidity is high.

During the present season upwards of 75 per cent. of the navel oranges in some orchards have been affected. Such oranges are dangerous to ship any great distance, especially overseas. However, they keep well enough to place on the Perth market if reasonable care is taken in handling. Except as regards their liability to mould, the quality of the fruit is not affected.

Prevention.—The method of preventing Crinkle is obvious, if not always possible of application. By proper cultivation and by judicious irrigation, when necessary, sufficient moisture should be kept in the soil to prevent the checking of the growth of the fruit. Heavy irrigation after the trees have definitely shown distress by wilting badly and dropping their leaves may induce rather than prevent the trouble. Moderate applications of water should be given whenever the trees, by the curling and wilting of the leaves, show that they are in need.

Where irrigation water is not available, little can be done except by early spring ploughing and attention to cultivation to conserve the soil moisture as much as possible.

Because of their earliness, navel oranges are particularly subject to Crinkle. Later varieties such as Valencias are rarely sufficiently advanced before the rains come to be affected.



Navel oranges showing crinkle.

Summary.—Splitting and Crinkle of early oranges, particularly navels, are consequences of a long dry period of insufficient moisture in the soil during the autumn and summer. Splitting results principally when a long period of soil dryness is followed by heavy rains. Crinkle is more common when light rains precede the heavy winter falls. Splitting and Crinkle are not frequent in well-cared for orchards in normal seasons.

Late varieties are much less liable to these troubles than early varieties.

Good cultivation to conserve soil moisture and the judicious use of irrigation during the hot dry months will prevent Splitting and Crinkle.

THE CUTTING OF POTATO SETS.

W. E. Collins,
Potato Inspector.

There are certainly occasions when the potato grower would be glad to cut his seed potatoes and plant the cut sets, but, in many potato-growing areas, cut sets are not planted because of the grower's experience that there is a great uncertainty as to the growth and healthy development of such.

It is to this problem that attention is directed here, and it can be shown that there is good ground to assume that, provided certain precautions are taken, the uncertainty as to the propagation of cut sets disappears.

In the spring crop, where the potatoes are usually planted in moist earth, the practice of cutting sets is followed regularly, and considerable confidence is felt in it. On the other hand in the summer crops, where the planting season frequently coincides with hot dry weather, the practice is regarded with distrust, and is but little adopted. In such seasons the grower has recollections of some years when carefully selected tubers, planted after cutting to make a limited supply go further, have rewarded his efforts by rows of "misses," so that a considerable portion of the ground has yielded no crop at all. Excessive rotting of cut sets is generally the consequence of high soil temperatures. What is absolutely essential to obtain successful crops is a cool planting, combined with a moderately cool season, whether cut sets or whole tubers are planted.

The optimum soil temperature for high yields is around 65 deg. F., any great increase above this tends to reduce crops.

In the light of the considerations advanced below, it would seem possible to follow the practice of cutting where other considerations seem to make it desirable, and at the same time almost completely protect oneself against the risk of such a failure on the part of the cut sets.

It is necessary now to consider the processes that occur at the cut surface of the tuber immediately after the cut is made; it will then be possible to show the experimental basis upon which the conclusion is reached that, if tubers are cut in a certain manner, they can be planted with as much confidence as whole tubers.

Like all other living plant tissues, a potato is a compact mass of tiny living cells, which are capable of displaying great activity under appropriate conditions. In the whole tubers these living cells are protected from outside influence by the corky skin consisting of many regular rows of flattened cells, which are deep and empty, but have their walls so impregnated with a fatty varnish-like substance that they keep soil water from percolating in amongst the living cells. This tough corky skin is also responsible for the fact that the numerous organisms in the soil, which thrive on dead organic matter, fail to thrive upon the rich organic store of the tissues within the tuber. If they were not protected by the corky skin, various moulds and bacteria of the soil would be able to grow upon and digest the walls of the living cells. These moulds and bacteria, however, are quite unable to attack the stores of plant food in the inner wall, because they can neither pierce the cells of the skin by force nor digest their way in, being unable to assimilate the fatty substance in the corky walls, which are akin in nature to the varnishes formed by drying oils such as linseed oil.

It is true that in the corky skin there are natural holes, places where gas exchange goes on between the air spaces inside the tuber and the soil—a necessary feature—because the living cells within the skins must breathe. The protection of these breathing pores against the entry of the various organisms of the soil is but little understood, and it is perhaps worth noting that the protection is by no means complete, and that the entry of various organisms which produce disease in living potatoes can be traced to penetration through their breathing pores.

If one's imagination will then picture the complexity of structure of a living tuber it will then be realised what the act of cutting across it with a knife may be. When the knife cleaves through the skin and shears through the living tissue, leaving a number of crushed and dying cells along the cut surface, the outside air obtains free entry to numbers of tiny corridors ramifying in all directions between the living cells, along which previously air movement had been but a slow gaseous diffusion.

Now when the outside air is thus brought in sudden direct contact with the living cells close to the cut surface, it will make a very great difference whether this air is dry or damp.

If the air be damp the living cells containing sugar and starch, from which more sugar is readily formed, will absorb water from the air, and as they become swollen, will let some of their sap ooze out into the walls. The sap thus diffusing over the cut surface, like a drop of liquid spreading in blotting paper, is not pure water, but a solution of various substances with drying qualities—known as a "suberin" deposit. As this deposit comes in contact with the outside air at the cut surface it tends to set to a varnish, similar in nature to that present in the cork walls of the normal skin.

The potato cut in moist air tends to form a continuous layer of this varnish-like substance below the dead cells, cutting off completely the living tissue within from the organisms in the soil capable of living upon their walls.

On the other hand if the potato be cut in dry air and left in dry air, less water is absorbed by the living cells than sap released into the walls, the deposit of suberin then becomes patchy and not continuous, and when the cut set is planted it seems to remain patchy for a long time, and between the patches the soil organisms penetrate. If the potato be cut and exposed not merely in the dry air, but in sunlight, this patchy production of suberin is much more marked, and the potato remains far more open to the entry of these organisms subsequently.

These organisms may cause the tuber to "miss" or may so reduce the food available for the growing plant that weak development may result.

The methods adopted by the Potato Branch to obtain this callousing or covering of suberin deposit, termed the "wet bag treatment" is to cut the sets into well-wetted bags, and leaving same for a period of 24 to 48 hours prior to planting.

During the experiments carried out at Burekup, July, 1927, six plots were planted with treated sets, as against six plots untreated, *i.e.*, planted immediately after cutting, the result being two tons per acre more in favour of those treated. The seed was equal, and on checking the germination was about the same, but it was noted that the treated sets "got away" first, and showed a more vigorous growth throughout.

Other enthusiasts: Mr. J. Brighton, Elleker, and Mr. A. H. Clarke, Roelands, have had equally gratifying results, and it is hoped that further experiments will be tried by other growers along the lines suggested.

FIG WASP

(*Blastophaga grossorum*).

An interesting and successful experiment has been made by Mr. C. Sporn, of Coolup, in the production of out-of-season Capri fruits for the propagation of fig wasps. His method is as follows:—

"Capri No. 3 trees are given a dressing of sulphate of ammonia about the 7th October. This produces a strong growth of laterals. On or about the 1st of November these laterals are pinched back to about three buds. This has the effect of producing at once a supplementary crop of Capri fruits. These fruits are sufficiently advanced by mid-December to receive the issue of fig wasps, which emerge from the normal spring crop of Capri fruits on the same trees, on or about the 16th of December.

"These supplementary Capri fruits again issue wasps about the 1st February in time to caprify the fruits of Capri No. 1.

"By the production of this extra crop of figs on the same tree the difficulty of carrying the wasp over from crop to crop has been greatly reduced."

To be successful the above-mentioned conditions must be followed. If left too late, the supplementary crop will not be sufficiently advanced when the December issue of wasps takes place.

The leaders of the trees must not be interfered with, only the vigorous laterals being stopped.

FRUIT EXPORT.

(Season, 1927-28.)

GEO. W. WICKENS,
Superintendent of Horticulture.

"Fortune is a fickle jade," and mixes her smiles and frowns in a manner which is at times very disconcerting to the recipients.

Last year Western Australian apple growers received the most indulgent smiles and gladdest of extended hands, while their brother growers in the Eastern States barely obtained a nod of recognition.

This year the position was reversed; they were favoured with an abundant, even a record crop, and we had insufficient to meet our overseas commitments. Production figures are not yet available, but I estimated in December that it would be in the vicinity of one-third of the previous season's crop which amounted to 901,464 bushels, and when details come to hand I do not think the estimate then made will be much astray. Particulars of quantities exported are a fairly reliable guide to the quantity produced, and these show that for the year ending 30th June, 1927, 494,641 cases were shipped to overseas markets, while for the year ending 30th June, 1928, only 169,273 cases were sent away, or very little more than one-third of the previous season's total. Exports of fruit other than apples were nearly the same in both years, amounting to 69,771 cases in 1926-27 and 66,225 cases in 1927-28.

Though the quantity exported this year was comparatively small, it is interesting to note that many markets received Western Australian fruit. Full details are as follow:—

EXPORT OF FRESH FRUIT FROM WESTERN AUSTRALIA FOR YEAR ENDING 30TH JUNE, 1928.

Destination.	Apples.	Grapes.	Pears.	Oranges.	Peaches.	Nectarines.	Plums.	Lemons.	Passion Fruit.	Quinces.	Tomatoes.	Cherries.	Grape Fruit.	Total.
	cases.	cases.	cases.	cases.	cases.	cases.	cases.	cases.	cases.	cases.	cases.	cases.	cases.	cases.
London	12,785½	6,992	5,505½	2,406	...	...	...	...	...	...	...	...	¾	27,689¾
Hull	413	351	1,736	...	...	...	...	...	...	...	...	...	...	2,500
New Zealand ...	...	583	...	459	...	...	...	30	...	...	...	...	...	1,072
Bombay	131	688	...	...	...	...	...	...	...	...	...	...	...	819
Calcutta	27	589	...	40	...	...	...	...	...	...	...	...	...	656
Durban	950	...	...	...	...	...	...	...	...	...	...	...	...	950
Colombo	1,868	12,569	89½	258	...	...	42	2	...	...	...	...	...	14,828½
Port Said ...	547	1,286	129	20	9	...	4	...	...	...	...	...	...	1,995
Hamburg	84,586	542	8,323¼	...	...	...	...	...	...	8	...	...	...	93,459¼
Stockholm ...	42,678	...	...	...	...	...	...	...	...	...	...	...	...	42,678
Marseilles	12	...	...	...	...	...	...	...	...	...	...	...	...	12
Dunkirk	50	...	...	...	...	...	...	...	...	...	...	...	...	50
Sourabaya ...	5,123	2,390	358½	306	35	16	37	...	...	5	1	...	...	8,271½
Batavia	2,997	2,014	298½	810½	14	9	60	80	...	...	1	...	...	6,284
Singapore ...	16,819	13,049	309½	3,004	97	34	59	370	1	...	10	7	...	33,759½
Samarang ...	287	89	10½	63	...	...	9	8	...	1	...	...	...	467½
Koepang	...	...	...	...	...	...	6	...	...	...	...	...	...	6
Totals ...	169,273½	41,142	16,760¼	7,366½	155	59	217	490	1	14	12	7	¾	235,498

ROYAL AGRICULTURAL SOCIETY'S SHOW, 1928.

New Educational Sheep Classes.—As a result of suggestions made by Mr. A. J. McDonald, the well known stud merino sheep expert, the Royal Agricultural Society has decided to offer three special prizes in the open class for sheep. The first of these will be for a pen of 5 merino rams, over 1½ and under 2½ years old, bred by the exhibitor. They are to be entered for absolute sale at a rate of 20 guineas per head minimum, to be judged on commercial lines as most suitable for producing flock rams for Western Australian pastoral conditions, and to be sold by auction at the annual Sheep Show or Stud Sheep Sale. If the upset price of 20 guineas per head is not individually obtained the exhibitor will forfeit his claim to monetary award, and the prize money will revert to the Society and be available for future competitions in this class. There are two prizes in the first class, the first prize being 10 guineas and the second prize 5 guineas, and there must be three entries or no award.

The number two Special Prize open class is for a pen of 10 merino ewes under 2 years bred by the exhibitor, to have been shorn as lambs. First, second and third prizes in this award are 20, 10 and 5 guineas respectively. In the Eastern States this is a much coveted class and attracts keen interest.

The number three Special Prize open class is for the best exhibit of 5 sheep, bred by one owner, to be selected from the exhibits in the general class, only one animal to be drawn from any one class. Owners are to notify the Chief Steward not later than 9.30 a.m. on the morning of judging, which sheep they intend to compete in this class. There will be no stipulation as to the date of shearing but a certificate stating the number of days growth of wool up to the day of judging must be made with each entry and a declaration as to age may be required.

From an educational point of view the introduction of these three new classes should be of the highest value, and may afford excellent opportunities of comparison between local breeders' studs and those of the Eastern States.

Awards Nos. 1 and 2 will be separate entries, and none of the sheep competing in these is eligible for competition in any other class, and for exhibition purposes will require to remain penned intact throughout the show. The entry for No. 3 Award will require to be drawn from all classes exhibited by any one breeder, and the sheep after being judged will be dispersed to their individual pens.

As the rams in No. 1 are to be sold at public auction at prices not below 20 guineas per head an opportunity is thus afforded local stud masters and others interested in the industry to secure rams of outstanding merit for raising the standard of the average flocks of merino sheep in this State, for it will be observed that the rams are to be judged on commercial lines as being most suitable for *producing* flock rams for W.A. requirements. With regard to No. 2, should there be Eastern States competitors it is quite probable that some of these will prefer to sell their exhibits rather than return them to their parent flock, and here again will be an opportunity for extending and improving the standard of our local merino studs.

For further information on these Classes inquiries should be addressed to the Secretary of the Royal Agricultural Society, whose address is 283 Murray street, Perth.

POTATO CHIPS.

G. N. Lowe,
Senior Potato Inspector.

LOSS OCCASIONED BY LACK OF STORAGE FACILITIES.

Potato growers, more particularly in the Great Southern areas, are apparently not alive to the economic loss brought about by their not providing ample shed accommodation for their crops.

Whilst it is of no great moment where seed is concerned to allow it to stand for a time in the paddock after bagging, provided the sun is not too fierce, in the case of marketables, three or four days in strong light brings about "greening," even through the bag itself, to an extent which is surprising.

"Greened" potatoes for table purposes are not only unpalatable, but when this condition is accentuated can actually become unwholesome.

The action of light induces the formation of an alkaloid called solanine which in quantity in poisonous.

Buyers are well aware of the unpalatability of "greened" tubers, and accordingly discount their offers for such produce, often to the extent of £2 and £3 per ton.

Where a quantity of potatoes are grown the loss occurring annually to such a grower represents very often the cost of the material sufficient to build a moderate sized shed, and it is extremely poor business to allow this to recur.

It is no uncommon sight in one district which the writer has in mind, for the sewn bags to be allowed to stand on end in moist soil until it is necessary to lay them down to avoid the bottom rotting out.

A far sounder and much more economical practice is to provide shed room sufficiently closed in to prevent strong light entering and causing loss and at the same time allowing the necessary ventilation.

A little method will enable the grower then to cart in each day's digging, more particularly, of course, where no immediate orders are forthcoming.

It may be impressive and a cause for satisfaction to the owner of the crop to see some hundreds of bags of tubers standing in massed formation in the paddock, but his banker would doubtless lose less sleep if he knew the crop was safely transferred to cover promptly, away from the risk of flood and deterioration.

A DOUBLE PURPOSE WIND-BREAK SYSTEM.

Messrs. Blake Bros., of Young's Siding, adopt the planting of maize as a most effective form of wind-break on their peat swamp land cropped during the summer.

Heavy winds, particularly from the eastward, are the source of considerable damage to potato crops in their locality, and portion of Messrs. Blake Bros.' land is on the shores of the "P.U." Lake and considerably exposed.

Wind-breaks of maize on Blake Bros.' swamp, Young's Siding—12 rows of potatoes and 1 row of maize alternating.

Specimen of Delaware grown by Blake Bros.

The planting is divided into narrow "lands" by means of one row of maize during that operation, and the accompanying illustration gives an excellent idea of the protective growth afforded.

The space so lost is very little and the protection so provided more than compensates, as without it the production of heavy crops such as these growers are in the habit of obtaining, would be impossible.

This type of wind-break has, of course, another and very important utility in the provision of green stuff for stock feed during the summer, when the need of such is most acute.

These growers believe in thoroughness in all their farming operations and are accordingly successful.

Incidentally they provided the greatest number of bags finally passed under the Certified Seed Scheme this season, and illustrations indicate the class of seed grown by them.

Portion of Blake Bros.' crop in the course of digging.

THE INTERCHANGE OF CERTIFIED SEED BETWEEN GROWERS IN SOUTH-WEST AND GREAT SOUTHERN DISTRICTS.

Inquiries in this direction are frequently made as to the possibility of a direct interchange of Certified Seed from the growers of such in, say, the Young's Siding area, who have supplied growers in the South-Western area with their particular strain under the certificate.

Naturally enough, growers who have had good results over a period of years have great faith in their own strain of seed and are anxious to retain it.

A difficulty, however, often arises in the proper keeping of the "Delaware" on the racks for so long a period due to its earliness and consequent quick sprouting, and it is here where November dug seed from the South-

West for January and February planting in the Great Southern areas nicely "fills the bill." The same applies also in the crop dug in May in the South-West for the provision of seed in the October and November planting in the Albany district.

The demand is, however, only for Certified Seed, and growers in both districts by arrangement can have their crops inspected under the Scheme with this end in view.

The Potato Branch is anxious to foster this trade between growers in various districts and welcomes inquiries of this description.

Such an interchange from the standpoint of expense really only resolves itself into the cost of certification plus railage between growers and

Two tubers equal one fork-full in Messrs. Blake Bros.' crop.

is distinctly preferable, of course, to buying possibly through merchants, who naturally must have their profit over buying price and railage charges.

Numerous instances have occurred this season where consignments have been brought from the Albany district to Perth, only to be reconsigned to the South-West almost at once.

The added railage alone in these instances amounted to about £2 per ton, which the grower-buyer had to pay.

RED-LEGGED EARTH MITE IN THE SOUTH-WEST.

At the time of writing, potato crops which are showing above ground are suffering badly from invasion by this pest.

Generally this active and destructive little insect is known as the "Red Spider" from its spider-like appearance, but the real "Red Spider" is dis-

tinct and is found in the autumn on the underside of apple, violet and convolvulus leaves for instance.

An excellent repellant against the Earth Mite is flake Napthalene broadcasted at the rate of about 1 cwt. per acre over the crop.

For ease and uniformity of sowing, dry sand to double the bulk of the chemical will greatly facilitate matters.

The application should be made just after a cultivation, the object being to allow it to remain on the surface where the higher temperature brings about the evolving of fumes which are so distasteful to the insect.

When a quick death dealing agent becomes necessary, nothing better has yet been discovered than sprays composed of water and carbolic liquids, commonly used as disinfectants.

Particulars of the disinfectants will be furnished upon inquiry.

APPLICATIONS UNDER THE CERTIFIED SEED SCHEME.

The attention of prospective applicants under the Certified Seed Scheme is directed to the following conditions which will operate in the coming season—

1. Their applications must be lodged with the Potato Branch early enough in the growing period to allow of at least two inspections prior to digging.

2. Notice of the intention to commence digging must be given to the Potato Inspection Branch 14 clear days beforehand.

3. The "strain" of the seed used in the area declared must be given where possible and from whence it originated.

4. The elimination of all plants of other than the specified variety must be attended to as soon as detectable.

5. The removal of all plants showing "Mosiae" (Crinkly leaf), Leaf Roll or other trouble, to be attended to as soon as noticed.

6. Tubers of 6 ozs. and over, only, are to be placed in the bags for final inspection, except in the case of March-July crops when 4ozs. shall be the minimum weight.

7. No seed is certified to until the Certificate is finally sealed on each bag.

8. Bags must be new, and be stencilled with the name and address of the grower in 2½in. letters.

9. Bags must be tightly double sewn, with the ends of the twine finishing in the centre of mouth of bag, and "Russian Hemp" twine is necessary in order to pass easily through the leaden seales.

10. No Certificate will be furnished unless the crop, considering the season, yield well.

11. A charge of 6d. per bag is made only for each bag actually passed.

12. To minimise "Storage trouble" forked and damaged tubers must not be placed in the bags.

13. Bags must be removed from the paddock and placed under cover as soon as is possible to avoid exposure troubles.

14. Briefly stated, the applicant must only place in his bags tubers for which he would willingly pay enchanced prices for seed purposes.

Growers will realise that for the sake of their own good name and future business that they must be absolutely careful as to what is placed in bags bearing their name and address.

Buyers have a right to expect the highest class seed that it is possible to buy when the certificate is attached to the bag and this Branch welcomes reports from buyers when they consider they have any cause for complaint.

Obviously, it is a physical impossibility for inspectors to examine every bag of seed and they have to rely largely on the grower to "play the game."

Should any complaint, upon investigation by officers of the Branch, prove well founded, the grower of the seed will confer a benefit after advice of such, by not forwarding an application in future seasons, as it will be politely but definitely rejected.

HERD PRODUCTION RECORDING.

Pure Bred Cows—Yields and Cost of Feeding.

P. G. HAMPSHIRE, Superintendent of Dairying.

P. C. COUSINS, Senior Herd Recorder.

Following the practice initiated five years ago in connection with herd production recording of pure bred cows, the fullest information is supplied showing details regarding the yields of herds of cows in Western Australia under the Australian Official Milk and Butter Production Recording Scheme. The data supplied includes details of the herds for the year 1927-28, together with the averages of former years.

In compiling the data the closest scrutiny is observed by official recorders of the foodstuffs consumed by the cows in each herd. The costs of the various foods debited are shown, certain of which are grown on the farms and are assessed at farm values, whereas concentrates are debited at average yearly market rates.

The information obtained may be viewed from many angles: herd average yields as milk and fat producers; herds expensively fed and herds economically fed; herds overfed and herds underfed. Profits over cost of feeding vary from £2 0s. 7d. to £17 18s. 3d. per cow, and in one instance a loss of

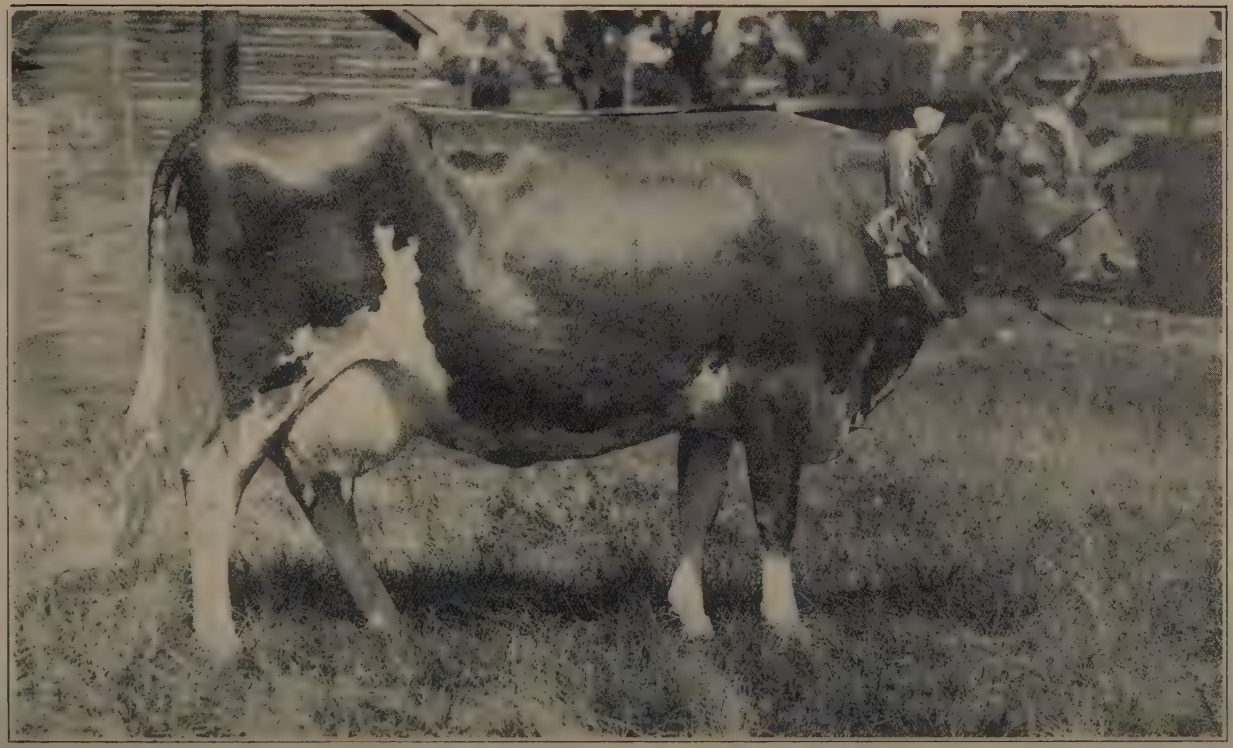
£4 19s. 2d. per cow. Profits of herds as milk producers vary from £4 6s. 9d. to £33 1s. 4d. per cow, and in one instance a loss of £5 4s. 7d. per cow is shown. One breeder is able to produce butter fat at a cost for feed of only £2 9s. 5d. per 100 lbs. fat yielded, whereas another finds it costs £8 14s. per 100 lbs. fat—this apart from the losing herd. Variations in the cost to produce one gallon of milk are from 3d. to 10½d. per gallon. The losing owner's herd cost 1s. 3d. per gallon produced to feed.

Herds, as profitable producers of milk or fat, vary considerably, and this generally follows according to the breed. One milking Shorthorn herd only shows a profit of £2 0s. 7d. per cow as fat producers, whereas as milk producers the profit is £12 3s. 10d. per cow. Another milking Shorthorn herd shows an increase from £17 12s. 5d. for fat to £33 1s. 4d. per cow for the sale of milk over the cost of feeding. Jersey and Guernsey herds, as a rule, do not show material difference as profit makers whether their produce is marketed as fat or milk, but in previous years we have many instances where these breeds show a greater profit as fat producers than milk producers. It should be considerable satisfaction to owners of good quality Jersey or Guernsey cattle to know that they can show as good a return from their cows by the sale of fat to a butter factory (even though they may be situated, say, 400 miles from the metropolis) as owners selling their produce as fresh milk and situated within range of the fresh milk requirements of the city.

The cost of feeding varies considerably, and in some instances this is principally due to the situation of the farm and the lack of farm-grown feed. One owner with Herd "E" shows remarkably economical feed costs per herd as the result of the utilisation of rich pastures. In this instance the owner has a large area of mixed pasture which has been well looked after and topdressed annually. Silage feeders show economical feeding, especially is this so in districts where the lack of green feed is paramount in the summer.

In assessing the average returns, readers are advised that approximately half the cows in the herds under observance are heifers under three years. Taking this into consideration, the average return of all cows, viz., 281 lbs. butter fat in 273 days, may be considered very satisfactory, as the data is derived from all cows under test whether or not they are above-standard producers.

That all pure bred dairy cows are not economical producers is clearly shown on perusing the details of the herds. The official recording of pure bred cows' milk yields is a basic principle of herd improvement in the utilisation of dairy sires for "grading up," and the accurate recording of the cost of feeding cows under test is a function corollary to testing. The aim of the Dairy Branch, in the first place, of supplying details of cost of feeding pure bred cows under official test was to disabuse the impression in some farmers' minds that pure bred cows' records were not economically obtained. The information secured in Western Australia during the last five years on the averages obtained may fairly be said to have achieved the purpose and definitely shows to the doubting "grade" herd owner the value of and where to obtain pure "production bred" dairy sires to proceed with a definite and reasonably reliable herd improvement policy.



"Pictoni Trequean Flirt."
Mr. A. W. Padbury's Guernsey Cow, which yielded under official test in 365 days 16,675 lbs. milk; average test 5.22 per cent.; 870.06 lbs. butter fat; 1,048 lbs. butter.

TABLE 1.—HERDS, IN ORDER OF MERIT, AS PRODUCERS OF BUTTER FAT—YEAR ENDED 30th JUNE, 1928.

Column.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.
Herd.	Average Fat per Cow for period of 9 months.	Average Skim Milk per Cow for Period.	Value of Fat for Period at 1/7½ per lb.	Value of Skim Milk for Period at 2d. per gal.	Average Value of Fat and Skim Milk per Cow for Period.	Cost of Feed per Cow for Period.	Net Profits per Cow for Period through sale of fat.	Value of Whole Milk at 1/3 per gallon, allowing for rearing calf.	Net Profit per Cow by sale fresh Milk at 1/3 per gallon.	Cost of Feed per 100 lbs. of fat.	Cost of Feed per gallon of Milk.
	lbs.	gals.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	d.
A ...	349·62	351	28 8 0	2 18 6	31 6 6	13 8 3	17 18 3	32 2 6	18 14 3	3 16 8	5·46
B ...	370·00	653	30 1 3	5 8 10	35 10 1	17 17 8	17 12 5	50 19 10	33 1 4	4 16 8	4·65
C ...	384·46	446	31 4 9	3 14 4	34 19 1	17 13 2	17 5 11	38 6 1	20 10 11	4 11 1	6·09
D ...	396·26	499	32 3 11	4 3 2	36 7 1	19 6 10	17 0 3	41 13 9	22 6 11	4 17 8	6·15
E ...	255·66	285	20 15 5	2 7 6	23 2 11	6 4 6	16 18 5	26 8 7	20 4 1	2 9 5	3·0
F ...	289·36	341	23 10 2	2 16 10	26 7 0	12 13 0	13 14 0	30 4 4	17 11 4	4 7 6	5·25
G ...	325·56	367	26 8 10	3 1 2	29 10 0	19 10 8	9 19 4	32 11 7	13 0 11	5 19 10	7·71
H ...	188·29	244	15 6 0	2 0 8	17 6 8	8 5 3	9 1 5	22 11 6	14 6 3	4 7 11	4·21
I ...	304·29	451	24 14 6	3 15 2	28 9 8	20 15 4	7 14 7	37 5 6	16 10 2	6 16 7	7·12
J ...	255·94	418	20 15 11	3 9 8	24 5 7	16 15 5	7 10 2	34 10 9	17 15 4	6 10 11	6·05
K ...	225·76	196	18 6 10	1 12 8	19 19 6	13 4 4	6 15 2	20 16 0	7 11 8	5 17 0	7·58
L ...	266·77	336	21 13 6	2 16 0	24 9 6	18 0 0	6 9 6	29 14 2	11 14 2	6 14 10	7·52
M ...	245·04	212	19 18 2	1 15 4	21 13 6	15 5 5	5 18 1	22 1 9	6 16 4	6 8 9	8·68
N ...	276·07	284	22 8 7	2 7 4	24 15 11	22 10 0	2 5 11	26 16 9	4 6 9	8 3 0	10·48
O ...	263·89	427	21 8 10	3 11 2	25 0 0	22 19 5	2 0 7	35 3 3	12 3 10	8 14 0	8·18
P ...	214·52	157	17 8 6	1 6 2	18 14 8	23 13 10	Loss4 19 2	18 9 3	Loss5 4 7	11 1 4	15·16
Averages	280·56	353	22 15 9	2 18 10	25 14 7	15 11 4	10 3 3	30 19 0	15 7 8	5 11 2	6·31

Chaff, £5 per ton ; Bran, £8 5s. per ton ; Pollard, £9 5s. per ton ; Crushed Oats, 3s. per bushel ; Linseed Meal, £13 10s. per ton ; Lucerne Pasture, 3s. per week ; Lucerne Hay, £7½ per ton; Green Maize, 7s. per ton ; Silage, 10s. per ton ; Brewers' Grains, 6d. per bushel ; Pasture, 1s. 6d. per week ; Sudan Grass Pasture, 3s. per week or 7s. per ton ; Sub. Clover pasture, 3s. per week ; Green Lucerne, £2 per ton ; Barley Pasture, 3s. per week.

AVERAGES OF ALL COWS RECORDED.

TABLE II.

	£	s.	d.
1.—592 gallons Milk and 280·56 lbs. Butter Fat.			
2.—353 gallons Skim Milk per cow.			
3.—Value of Butter Fat at 1/7½ per lb.	22	15	9
4.—Value of Skim Milk available for pig feeding	2	18	10
5.—Total credits to cow by sale of Butter Fat and Skim Milk	25	14	7
6.—Cost of feed for Period	15	11	4
7.—Profit by sale of Butter Fat after deducting feed costs...	10	3	3
8.—Value of Whole Milk if sold at 1/3 per gallon	30	19	0
9.—Profit by sale of Fresh Milk at 1/3 per gallon after deducting cost of feed	15	7	8
10.—Cost of feed per 100 lbs. Butter Fat produced ...	5	11	2
11.—Cost of feed per gallon of Milk produced	0	0	6·31

HERDS IN ORDER OF MERIT AS PRODUCERS OF MILK.

TABLE III.

Herd.	Milk. Average Gals.	Fat. Average lbs.	Cost of Feed per Cow.	Profit as Milk.	Profit as Fat.	Cost to Produce 100 lbs. Fat.	Cost to produce 1 Gallon Milk.
			£ s. d.	£ s. d.	£ s. d.	£ s. d.	d.
B ...	925	370·00	17 17 8	33 1 4	17 12 5	4 16 8	4·65
D ...	755	396·26	19 6 10	22 6 11	17 0 3	4 17 8	6·15
C ...	698	384·46	17 13 2	20 10 11	17 5 11	4 11 1	6·09
E ...	516	255·66	6 4 6	20 4 1	16 18 5	2 9 5	3·0
A ...	590	349·62	13 18 3	18 14 3	17 18 3	3 16 8	5·46
J ...	665	255·94	16 15 5	17 15 4	7 10 2	6 10 11	6·05
F ...	578	289·36	12 13 0	17 11 4	13 14 0	4 7 6	5·25
I ...	701	304·29	20 15 4	16 10 2	7 14 7	6 16 7	7·12
H ...	471	188·29	8 5 3	14 6 3	9 1 5	4 7 11	4·21
G ...	607	325·56	19 10 8	13 0 11	9 19 4	5 19 10	7·71
O ...	674	263·89	22 19 5	12 3 10	2 0 7	8 14 0	8·18
L ...	515	266·77	18 0 0	11 14 2	6 9 6	6 14 10	7·52
K ...	418	225·76	13 4 4	7 11 8	6 15 2	5 17 0	7·58
M ...	436	245·04	15 5 5	6 16 4	5 18 1	6 8 9	8·68
N ...	515	276·07	22 10 0	4 6 9	2 5 11	8 3 0	10·48
P ...	375	214·52	23 13 10	Loss5 4 7	4 19 2	11 1 4	15·16
	592	280·56	15 11 4	15 7 8	10 3 3	5 11 2	6·31

HERDS IN ORDER OF MERIT, SHOWING COST OF FEED PER 100 LBS. FAT.

TABLE IV.

Herd.	Cost of Feed per 100lbs. Fat.	Under Average.	Over Average.
	£ s. d.	£ s. d.	£ s. d.
E	2 9 5	3 1 9	...
A	3 16 8	1 14 6	...
F	4 7 6	1 3 8	...
H	4 7 11	1 3 3	...
C	4 11 1	1 0 1	...
B	4 16 8	0 14 6	...
D	4 17 8	0 13 6	...
K	5 17 0	...	0 5 10
G	5 19 10	...	0 8 8
M	6 8 9	...	0 17 7
J	6 10 11	...	0 19 9
L	6 14 10	...	1 3 8
I	6 16 7	...	1 5 5
N	8 3 0	...	2 11 10
O	8 14 0	...	3 2 10
P	11 1 4	...	5 10 2

Average of all Herds, £5 11s. 2d.

HERDS IN ORDER OF MERIT, SHOWING COST OF FEED PER GALLON OF MILK PRODUCED.

TABLE V.

Herd.	Cost of Feed per Gallon of Milk.	Under Average.	Over Average.
	pence.	pence.	pence.
E	3·0	3·31	...
H	4·21	2·10	...
B	4·65	1·66	...
F	5·25	1·06	...
A	5·46	·85	...
J	6·05	·26	...
C	6·09	·22	...
D	6·15	·16	...
I	7·12	...	·81
L	7·52	...	1·21
K	7·58	...	1·27
G	7·71	...	1·40
O	8·18	...	1·87
M	8·68	...	2·37
N	10·48	...	4·17
P	15·16	...	8·85

Average all Herds, £6·31d.

HERD AVERAGES FOR 5 YEARS, 1924–1928.

TABLE VI.

Year.	Milk.	Average Fat per cow for period of 9 months.	Average Skim Milk per cow for period.	Value of Fat for period.	Value of Skim Milk for period at 2d. per gallon.	Average Value of Fat and Skim Milk per cow for period.	Cost of Feed per cow for period.	Nett Profit per cow for period through sale of Fat.	Value of Whole Milk at 1/3 per gallon, allowing for rearing calf.	Nett Profit per cow by sale of Fresh Milk at 1/3 per gallon.	Average Cost to produce 1 lb. Fat.	Average Cost to produce 1 gallon Milk.
	galls.	lbs.	galls.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	pence.	pence.
1928 ...	592	280·56	353	22 15 9 (at 1/7½ lb.)	2 18 10	25 14 7	15 11 4	10 3 3	30 19 0	15 7 8	13·34	6·31
1927 ...	602	290·72	362	23 0 4 (at 1/7 lb.)	3 0 4	26 0 8	14 10 5	12 6 8	31 10 6	17 0 1	12·00	5·79
1926 ...	624	312·01	393	24 14 0 (at 1/7 lb.)	3 5 6	27 19 6	14 14 7	13 4 11	32 5 5	17 10 10	11·15	5·66
1925 ...	652	308·59	407	22 10 0 (at 1/5¼ lb.)	3 7 10	25 17 10	14 13 2	11 4 8	30 10 5	15 9 5	10·77	6·15
1924 ...	600	319·50	362	25 19 2 (at 1/7½ lb.)	3 0 4	28 19 6	10 4 10	18 14 8	32 1 3	21 16 5	7·7	4·09
Average for 5 yrs.	614	302·29	373	23 18 6 (at 1/7 lb.)	3 2 2	27 0 8	13 18 10	13 1 10	32 7 8	18 8 10	11·08	5·45

THE WYNDHAM MEAT WORKS.

By The Editor.

In June, 1915, Parliament passed a Bill for the establishment of Meat Freezing Works at Wyndham, actuated by a desire to supply meat for the allied troops, and at the same time assist in the development of those immense areas of pastoral country that form the Kimberley Division of this State. Synchronically at Port Darwin the erection of Meat Freezing Works for the well known firm of Vestey Bros. was in progress with a similar object and for the immediate advancement of the pastoral industry in the Northern Territory. Some feared that these two ventures taking place in what, for a country of such vast distances, might be termed close proximity, would militate one against the success of the other. There were differences of opinion upon the advisableness of the step taken by the State Government, but in the main it was agreed that the movement must help along the progress of North-Western Australia. Years have passed and, unfortunately, Vestey

Rake of Tallow (44 tons). Part of shipment for London.

Bros.' Works, by far the larger of the two mentioned, has ceased operations, but the plant remains a monument to the enterprise of those who strove to meet the national need and carry on for a while a work of paramount importance. The Wyndham Meat Works, however, still continues to operate for the benefit of the State, and while unable to keep the wheels of industry revolving throughout the full year, owing to an insufficient supply of cattle, the work in season is a substantial contribution to the furtherance of the cattle-raising industry of the surrounding country for many miles.

A visit to the Wyndham Meat Works is included in the itinerary of a North-West run by our coastal steamers in the touring season. To those who have read the gruesome descriptions of freezing and canning works in

some parts of the world, it is probable that this item in the tourist's programme will have little appeal. Nevertheless, it can be truthfully stated that, as carried out at the Wyndham Works there is a minimum of the sordid, and the expedition and efficiency of the plant and staff create an interest that neutralises the repulsion generally associated with the slaughtering of animals.

Cattle for the Wyndham Works are brought in from the surrounding country for hundreds of miles and pastured at Chimooli, eight miles from the township, and from thence drafted to the killing yards as required for each day's operations. The approach to the killing pen is by a long race terminating in the interior of the building. The pen is entered by a doorway, and the animals are not unduly excited as they come to a halt one at a time. On an elevated platform stands the knocker-down armed with a heavy

Rake of Dried Hides (120 tons). One shipment for West Australian Tanners.

sledge hammer, and this operator, like all others engaged at the works, is an expert at his calling, and works swiftly and accurately. During a two-hours' visit to the Works never once did the writer see an animal move voluntarily after the stroke of the hammer had been delivered. Coincidently with the fall of the beast the floor of the pen drops to one side and the carcase rolls or slides to the cement floor of the huge building. Here it is immediately seized by the chainer-up, who deftly encircles the hind legs, and it is at once hoisted up to steel rail travelling way, which runs round three sides of the interior, and is passed to the bleeder, thence to another operator who quickly removes the head, and then to the skinner who removes the hide. From the time when it dropped to the floor of the killing pen there has never been the slightest struggle or sign of returning consciousness, and nothing could be more humane than the conduct of these operations. The carcase is then opened and pushed along to the inspector for examination. Of these there are three, the chief or senior being a veterinary officer. Having been certified free from diseases the offal is removed and passed through

various chutes to the building below where a receptacle is waiting to receive whatever part of the entrails is to be treated. The carcase is then split down by a circular saw swinging from the girder and worked by electricity, This saw is guided by handles at each side of the axis around which the blade revolves and is so adjusted as to be lowered or elevated as the work requires. Having been thoroughly washed and cleaned the sides then disappear into the chillers. Subsequently these sides are graded and quartered and then passed through to the freezing chambers, where it is sewn up in hessian and remains there some five days until it is properly frozen and ready for shipment. In other freezing chambers are to be found a variety of parts such as tongues, tails, kidneys, hearts, livers, cheeks, tripes, shin beef, neck beef, clod beef, all frozen as hard as stone and stacked in orderly profusion. Most of these pieces are exported to England, although there are also orders for Fremantle.

Loading Tallow and Case Meats on to Meat Boat.

In the Canning and Extract Departments goods for export and local sales are prepared, and comprise a variety of dainties calculated to tempt the appetite. It is said that the manager of this sub-department excels in the preparation of these comestibles, and the demand for his productions, coupled with the recent contract obtained for the supply of the Commonwealth Naval Department's requirements, amply support the contention. Boiled and corned beef are mainly put up in 6lb. tins, while assorted meats are contained in 1lb. and 2lb. tins, and are principally for export or coastal trade supply. Other products are roast beef, sausages, ox tail, mince collops, luncheon beef, steak and kidney, cheek and beans, ox cheek, and haricot steak, whilst dripping is also put up at the Works and has a ready sale packed in 24lb. and 38lb. cans. The Wyndham extract of meat enjoys a wide reputation for excellence and strength. In the process of manufacture the meat is cooked in huge scalds and gradually reduced by steam to the right consist-

ency, and when the moisture has been removed it is packed in 12oz. and 56lb. cans; the former for local trade and the latter for export. These smaller cans are air tight and so put up that they can be reclosed when portion of the contents have been removed, thus preserving the food in pure condition over a period.

It has been said that in some of the large canneries in Chicago nothing is wasted but the squeal. At Wyndham there is no squeal to waste, and consequently nothing is wasted. The offal of all kinds, after the tallow has been extracted, is reduced to fertiliser and poultry meal, and there is a far greater demand for these side lines than the Works are able to supply.

Where there is to be no waste it is essential that a huge undertaking of this nature must be practically self-contained, and this the Wyndham

Beef in Freezing Chamber.

Meat Works claims to be. It administers numerous departments, among which are included a Cattle Purchasing and Receiving Department, involving even the inspection of cattle runs, and the advancement of loans to growers for the purpose of expenditure in the direction of increasing and improving the crop of cattle upon which the operations of the works depend. Such loans are used in the purchase of bulls, fencing of runs and providing water supplies for stock.

In addition to the Slaughtering and Freezing Departments there are others for the manufacture of accessories to the business. Thus there is a tinshop where tinplate is cut and fashioned into containers for the various products, a box-making factory with up-to-date machines turning out cases, in the making of which karri timber is chiefly used; a cooperage with cunning devices by which staves, tops and bottoms are cut from the seasoned material, shaped, bound and converted into sound barrels for the shipment of tallow, edible fats, oil, etc., etc. In another apartment employees are

Yarding Cattle at Works.

View from top of Main Freezing Block.

busy cutting and sewing bolts of hessian, and transforming them into suitably shaped coverings for the quarters of beef and other commodities to be frozen. Then there is the Hide Department, where skins are salted and cured, ready for despatch to the tanneries; and in all departments labour-saving machines of modern type are in use and waste energy eliminated in every manufacture.

The motive power at the Works comprises four sets of Diessel engines and two water tube boilers, all using crude oil for fuel, of which there is a large reserve included in the outlay of the plant as well as refrigerating machines with power motors, generators and lighting installation.

On the foreshore a jetty is provided having a berth accommodation of 30ft. of water at low tide, capable of receiving the large ocean-going steamers which load the frozen beef, tallow, and other products exported to Great

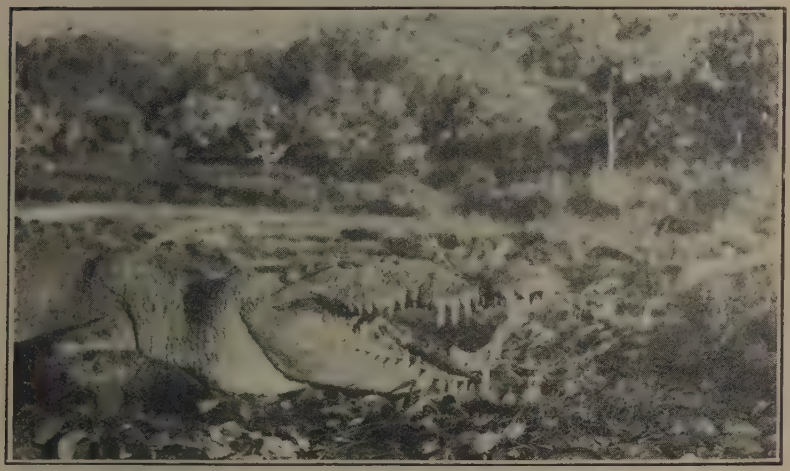
Front view of Freezing Block, Power House and Store. Mt. Bastion in background.

Britain, the Continent and ports along the Suez route, the agency and stevedoring of these steamers being provided by the meatworks staff. The State motor vessels "Koolinda" and "Kangaroo" also berth here and inward and outward cargo for the works and the township are handled by staff and operatives, while a railway under the same management connects the jetty with Wyndham. At low tide along the foreshore, and especially where the effluent from the works discharges into the sea, huge crocodiles are to be seen on many occasions, some of these being 12 to 15 feet in length. Although not without some tragic happenings, it is fortunate that these amphibious do not wander far from the water's edge, and as the townspeople are wary few accidents have been recorded.

From the King River, 20 miles away, a fine water supply is obtained and conveyed by pipes to the 1,000,000 gallon concrete reservoir situated on the hill which overlooks the works, and from this the township and ship-

ping, as well as the Meatworks, are supplied. The Works also maintains the launch "Kimberley," by which pilotage and other port services are rendered.

A notable feature of the undertaking is the co-operative spirit developed throughout the staff, for whom every comfort and convenience, consistent with a sub-tropical climate, have been provided. Before the season commences most of the employees are brought up from the metropolitan and coastal districts, and during the operating period they are housed in substantial buildings contiguous to the Works. A dining room and well equipped kitchen, with a capable staff, provide excellent meals, and for recreation there are out-door and in-door picture and dance halls, reserves for out-door sports, billiard room and a dry canteen. Both men and women appear to be well satisfied and, as a result, there is never a shortage of labour, but rather a rush to secure an engagement when the season is about to begin. As each employee becomes more or less a specialist in his work, and as each rarely



Alligator enjoying early morning sun at back of Meat Works.

fails to apply for re-engagement at the commencement of the season, there is very little change in the personnel of the staff from year to year.

Apart from making a profit over working expenses, the Wyndham Meat Works serves many useful purposes from which the State receives indirect benefit. One of the principal handicaps is a lack of continuous supply of cattle to keep the Works operating. During the 1928 season 27,127 head of cattle were treated, but owing to the dry season experienced the beef was much lighter, although the quality was much better than had been anticipated.

Cattle are purchased from growers under a purchase contract and paid for by dressed weight, and all sellers, whether large or small sales are effected, are on an equal footing as regards prices, terms and conditions. The scale of prices is fixed for the season and the rates per 100 lbs., dressed weight,

accord with the grades of beef, whether export or non-export qualities. Prices depend also upon the months in which the cattle are treated. It is necessary to spread deliveries of cattle over the operating season according to the capacity of the works for treatment. Suppliers who cannot be accommodated during the most favourable months for good yields of beef are paid higher rates to compensate, as shown in the following scale:—

4. Prices.—In respect of cattle delivered in accordance with this agreement, prices shall be computed upon the chilled dressed weight of the carcases over the scales at Wyndham Meatworks, at the following rates per 100lbs., namely:—

(*a*) For beef "Approved" and/or "Passed" for export, under "Commerce Act" Regulations, hereinafter referred to as export beef—

	Grades.	
	Approved.	Passed.
	£ s. d.	£ s. d.
From cattle slaughtered on or before 30th April	0 19 0	0 16 4
From cattle slaughtered on or after 1st August	0 19 0	0 16 4
From cattle slaughtered after 30th April but before 1st August	0 18 0	0 15 4

	Rejected.	Condemned.
	£ s. d.	£ s. d.
(*b*) For beef not accepted for export but passed for local consumption or for canning ...	0 6 6	...
(*c*) For beef condemned	...	0 5 0

Such prices cover purchase of the whole animal, including hide and all other products.

If the average realisation of the exported frozen beef exceeds the estimates upon which the scale of prices has been based, the excess is distributed to the suppliers pro rata on the exported weights of beefs from their respective cattle. The 1927 season's returns per head to suppliers ranged from £5 7s. downwards, the average of 26,374 head treated being £3 19s., although the figures may yet have to be adjusted by a few pence when complete returns have been received and accounted.

There can be little doubt that these works are playing an important part in the development of the far North of this State, and are destined to enlarge their sphere of usefulness in the supply of meat to our Metropolitan markets when the supply of cattle increases and means for transporting chilled instead of frozen carcases come within the scope of practical politics. Every credit is due to the Government and to the management and staff of operatives and officials for the practical aid they are rendering the squatter in the great North-West.

GUILDFORD GRASS.

(*Romulea rosea* (Linn.) Eckl.)

W. M. CARNE and C. A. GARDNER.

This common weed is more generally known in the Eastern States of Australia as "Onion Grass," Although residents of the South-West, and particularly the metropolitan area, are familiar with this gregarious plant, it has not been established here for as long a period as many of our common weeds. It was not known in this State in 1870, so that its spread is all the more remarkable. At least three species or well marked forms are now naturalised in Western Australia. One has yellow flowers, the others having pink or violet flowers. The genus is a large one, the species extending from Southern Europe to South Africa.

Th generic name, Romulea, is derived from Romulus, who with Remus was the founder of the city of Rome; several species grow in the Roman States. The specific name refers to the colour of the flowers.

In Australia the distribution of Guildford Grass is mainly determined by the climate. It prefers a mild winter with a rainfall of 25 inches or more, and a relatively dry summer. Heavy or clay soils are preferred to sandy or light soils. It does not thrive in places which are dry in winter or in soils rich in humus.

The weed is distributed by small corms and by seeds. Stock and birds may help in the spread of the seeds. Both means of reproduction are very effective. In certain localities, such as the Helena Valley and the banks of the Swan River, the weed has become so gregarious in the bush that it has succeeded in replacing the shrubby vegetation. The corms (popularly known as bulbs) are rich in starch, containing nearly twice as much as potatoes. The fruits before ripening have a flavour which is not unpleasant, and are known to children as "puddings." Children sometimes eat the corms also. The leaves have a very low fodder value, and characterised by bands of strong fibres.

Economics.—Guildford Grass must be regarded as a serious weed in the coastal belt, especially on the heavy soils of Swan Valley. It occupies the ground to the exclusion of more useful plants and provides little feed for grazing stock, though eaten to a small extent when young. When the leaves are mature, the fibre renders them very indigestible. If eaten by horses, it may cause indigestion and colic and it is reputed to cause scouring in young cattle. Pigs on the other hand will root up and fatten on the corms.

There are possibilities of the plant proving useful as a source of fibre but this has yet to be commercially demonstrated.

On lawns and playing grounds the weed is decidely objectionable. Except when very short, it is difficult or impossible to cut with a mower. On playing grounds it makes running difficult and players are very liable to slip.

Guildford Grass.
(*Romulea rosea.*)

Control.—The most effective and economical method of controlling Guildford Grass in pastures is to sow clovers, particularly subterranean clover, and to top dress each autumn with superphosphate. A strong growth of clovers and grasses is followed by a weakening and disappearance of the weed. The weed is of little consequence on cultivated land. Where a pasture is badly affected it can be cleaned in a few seasons by ploughing in the autumn and sowing crops of oats with about 2 lbs. subterranean clover seed per acre. A top dressing with superphosphate should follow each autumn until the weed is well under control.

Lawns should be close cut and top dressed with well rotted stable manure. The manure should have been stacked long enough to ensure the death of the weed seeds it is certain to contain. If only patches of Guildford Grass are present, the turf should be taken up at a depth great enough to include the corms and replaced with clean turf. Playing grounds should be ploughed over when the plants are in flower and left in the rough until the return of the warm weather in late spring.

Description of Plant.—A perennial herb. Corms globular and covered with a shining brown tunic. Leaves 4-15 inches long, bright green, somewhat flaccid, deeply groved on each face, thick, resembling a Maltese Cross in section. Flowers solitary, 2-4 on each plant, on stalks much shorter than the leaves, the spathes with two valves. Flowers pink to pink-purple with a yellow throat, up to 1 inch in length, greenish outside. Segments of the flower 6, stamens 3 with hairy filaments; style slender with 3 bifid branches, shorter than the stamens. Fruit a 3-celled capsule oblong in outline; seeds numerous and brown in colour.

Another species with pale violet flowers (R. parviflora) has narrower leaves, usually shorter flower stalks and both the spathe valves brown-dotted, whereas in R. rosea only the upper valve is dotted.

R. rosea is native to South Africa, while R. parviflora comes from Western Europe. Both species flower between August and October.

These plants are not grasses, but belong to the Iris family.

RUTHERGLEN BUG.

(Nysius vinitor.)

Order: *Hemiptera.* Family: *Lygaeidae.*

L. J. NEWMAN,
Entomologist.

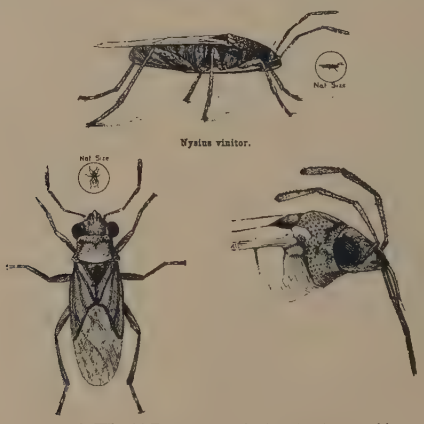
The Rutherglen Bug belongs to the Order *Hemiptera* and to the Family *Lygaeidae.*

The adult members have four wings, and are capable of considerable flight. It is what is termed an Haustellate or sap-sucking insect, in both the pre-winged and winged stage.

The adult is a small light brown fly-like insect, measuring about one-sixth of an inch in body length and slightly under one-quarter of an inch from wing tip to wing tip, when these organs are fully expanded.

The wings are silvery grey, semi-transparent, and traversed by a few dark lines, which form a somewhat undefined cross on the back when folded.

The elongate slightly curved white eggs are laid in clusters upon certain weeds or cultivated plants. They hatch in from six to 10 days into tiny nymphs. The nymphal stages, of which there are five, occupy about 24 days. The bugs are then full grown, making a maximum period of 34 days, from egg to adult.



Nysius vinitor.

N.S.W. "Journal of Agriculture."

The adult bug is incapable of depositing eggs until 10 days after the final moult. Eggs are then deposited over a period of three weeks. From three to 400 eggs may be laid by each female.

During the pre-winged stages the bugs are somewhat scattered, but when adult they are gregarious, moving about in vast armies. It is during the adult stage they usually fly or find their way into the cultivated crops of fruit or vegetables.

The food of this bug is obtained by the insertion of the rostrum or beak into the sap cells of the plant that serves for their nutrition.

It is their concentrated hordes that causes the very great damage to crops such as potatoes, tomatoes, Cape gooseberries, etc.

The weather by the time the adult bug stage is reached has become hot and dry. It is under these conditions that a sucking insect, such as the above, causes very serious damage. The crop is naturally finding the conditions somewhat dry, and consequently the supply of moisture to foliage has become reduced. Further, the loss of moisture by transpiration through the leaves, is very great. Plus this, by the attack of myriads of sucking bugs and the plants soon show signs of stress, resulting in shrivelled leaves and consequent reduction of crop.

During last October to December plagues of this bug were experienced in many parts of the South-West, potato crops in particular being seriously damaged.

Prevention.—First and foremost we must take preventive measures. Experience has taught us that it is very difficult to attack this pest when it gets into a crop without causing damage to the fruit or vegetables.

Complete farm or orchard sanitation must be practised, which means the keeping down of all weeds and rubbish, and the cultivation of the orchard or crop.

It is a common mistake with many growers to permit the headlands and fence alignments to become rubbish tips, and all sorts of weeds allowed to grow there. It is of little use spraying the crops, if alongside these conditions exist. The bugs will find shelter and breeding grounds therein, and will rapidly reinfest the previously treated crop. By clean farming methods many of the pests now injuring our crops can be suppressed.

As far as is possible land to be cropped should be kept under clean weed-free fallow several weeks before planting.

The absence of weeds or other rubbish will render the conditions unattractive, and hence the land will be clean when the crop is sown. If rank growths of weeds and rubbish are allowed to accumulate until just before the crop is to be planted and then turned in, insect troubles are sure to follow.

To fallow land is the greatest insurance against crop pests that we know of.

Treatment.—Keep a sharp look-out for the first signs of the pest, and take immediate action.

Occuring in colonies as they do, they can readily be destroyed with any approved sprays or dusts.

It must be distinctly understood that being a sucking insect, it is of no avail spraying in the ordinary way with arsenate of lead or Paris green, as these poisons so applied are only effective against mandibulate or chewing insects.

The effectiveness of contact sprays or dustings depends upon the thoroughness of application. The objective is to bring every bug into contact with the insecticide being applied. In other words, you only kill those you hit.

An effective proprietary spray is that sold under the name of Benzole emulsion. It should be used as directed on the containers: 1lb. to 5 gallons of water.

A home-made preparation which has given good results is made as follows:—Sunlight soap, 8 ounces; turpentine, 8 tablespoonsful; water, 4 gallons. Shred the soap and dissolve in 2 gallons of boiling water. Remove from fire and add the turps stirring well for 5 minutes. When this operation is completed, add the balance of 2 gallons of hot water. Apply hot.

For such crops as potatoes the following mixture is good:—1 quart of phenyle, 3 lbs. washing soda, 1 bar of yellow soap, 40 gallons of water. Shred the soap and dissolve in boiling water, to which the other ingredients are added, and make up to 40 gallons.

A sweetened poison bait, consisting of ¼ oz. arsenate of soda dissolved with 3 lbs. of molasses or treacle, and 1 gallon of water will act as a poison.

The bugs readily suck up the sweetened poisoned liquid, and are killed thereby.

Note.—This spray can only be applied to weeds, straw, or other material that may be spread about for the purpose. If applied to the crop foliage, it will have a burning effect.

Carbolic Lifebuoy soap, 1 cake to 1½ gallons of water, is effective. Black Leaf 40, 1 pint to 80 gallons of water, with 3 lbs. of soap. Shred the soap and dissolve by boiling, and add to the Black Leaf 40.

Cyanogas Dust A.—Experiments with this dust were made, and proved it to be the most effective of all specifics tried.

This is a prepared calcium cyanide, which is applied per medium of a dust gun.

The best results follow the application of this insecticide, if used during the heat of the day and when little or no wind is blowing.

In the trials made, the amount of dust used was 25 lbs. per acre. The effect was instantaneous, the bugs falling dead in masses.

Like all other insecticides, it must be thoroughly applied and sufficient used. In many instances failure to obtain satisfactory results is due to the skimping of the amount applied. This dust, together with full instructions how to use, is obtainable from city merchants.

Trapping method.—Make shelters, or congregating places for the bug, by piling heaps of rubbish here and there. The bugs will congregate under these heaps, and may be destroyed by spraying them with any contact wash or the application of boiling water. The bugs in these heaps must be dealt with before they become warmed up by the sun.

Another method of trapping.—Take a tarred sheet of canvas, and spread under the vines or trees affected. This should be done in the morning whilst the bugs are somewhat inactive.

Jar the trees or vines with a stout piece of wood, wrapped in bagging, so that the bark is not bruised. The jarring will cause the bugs to fall on to the tarred sheet, where they will be held captive.

If possible to fire an infested area, myriads of bugs can be destroyed.

It behoves all growers to be on the alert, and take action as soon as the pest makes its appearance.

Co-operative effort is needed so that all swarms may be attacked and destroyed.

WORMS AFFECTING SHEEP IN WESTERN AUSTRALIA.

H. W. BENNETTS, M.V.Sc.

Worms are one of the chief causes of sheep troubles in this State, and many sheep are lost annually from ravages of these parasites, particularly during the period from summer to early winter.

The most important worm economically is probably one species of stomach worm (*Haemonchus contortus*), though other species of stomach worms and lung worms are also responsible for loss.

Though sheep of all ages are liable to infestation with worms, young sheep are more prone than mature animals to display symptoms. Nevertheless, it must be remembered that the older sheep running in the same paddock will be carrying the parasites too, and increasing the infestation of pastures and young stock.

The majority of worms require for their development, outside the body, both moisture and warmth. For this reason wet and low-lying ill-drained land is liable to be heavily parasitised, and consequently dangerous to stock depastured on it. Over-stocking is one of the greatest factors in propagation of parasites.

1.—GENERAL CONTROL MEASURES.

Bearing the above facts in mind it will be seen that on properties where parasitic troubles are experienced, the following general measures should be adopted:—

(a) Treatment of sheep as indicated specifically later.

(b) Young sheep should be separated as early as possible from older sheep, and run on the highest and driest parts of the property.

(c) Sheep should, as far as possible, be watered from troughs. Soaks, drains, etc., provide ideal breeding grounds for parasites. Where worms are known to be a menace waterholes should be fenced off and mills, tanks, and troughs installed. Where possible low-lying pastures should be drained.

(d) Over-stocking should be avoided, and the general health of sheep built up with a generous supplementary diet such as oats and concentrates.

(e) Licks, such as the following, may also be of service: salt, 40 parts; bonemeal or superphosphate, 10 parts; iron sulphate, 4 parts.

2.—STOMACH WORMS.

The barber's pole worm (*Haemonchus contortus*) appears to do more damage to sheep in this State, than any other species.

It is about a quarter to half an inch long and very fine, and it is easily recognised because of the spiral red and white striations in the female, to

which that parasite owes its common name. Its habitat is the fourth stomach, where it lies free or attached to the lining. There are also other smaller species of stomach worms—chiefly the *Ostertagia* species—which can just be seen with the naked eye. These species are not nearly so common as *Haemonchus contortus*. The symptoms produced are similar in each case and the treatment is the same, though not so effective for *Ostertagia*. If very numerous, stomach worms can easily be seen on account of their writhing movements in the contents of the stomach. If they are not sufficiently numerous to be detected in this way they may be found, if present, by diluting some of the contents of the stomach and scrapings of its lining with water, putting it into a shallow glass vessel, and swilling the mixture around over some dark surface. The whitish worms can then be seen against the dark background.

Symptoms.—Young sheep, especially weaners, are particularly liable to be infested. The symptoms of infestation are scouring and loss of condition, anaemia, and frequently "bottle jaw," with death from a week or two up to several months after the appearance of symptoms.

After death the carcase will be seen to be very emaciated, and the body cavity often contains a large amount of fluid. Bottle jaw is due to collection of fluid below skin. The blood is "watery." Mortality may be up to 100 per cent., and in spite of recovery untreated animals may remain carriers from two to four years.

In this State sheep usually show symptoms in the summer and onward into the early winter.

Life History.—The eggs of the worm are passed out in the dung, thus contaminating the pastures. They, however, require moisture and warmth for further development, and will not survive dry conditions for any length of time. Apparently, in this State, large numbers of eggs hatch out in the spring (warmth and moisture). Natural infestation results from the ingestion by the sheep of the "larvae" (young worms), which have reached the infective stage, either with feed or with drinking water. Infestation on pastures is favoured by the fact that larvae will follow moisture (dew and drops of water) that collect on the ends of blades of grass at night and on rainy days. The pastures become increasingly infected year after year by sick animals or even apparently healthy animals which are carrying the parasites and excreting enormous numbers of eggs.

The larvae are very tenacious of life, and are able to withstand very unfavourable conditions (such as dryness or the direct rays of the sun) for a very long time. In fact they may live on pasture even under adverse conditions for at least twelve months. For this reason a pasture cannot be considered free from infection for a year or more after the last affected sheep has left the property. *Haemonchus contortus* also affects cattle.

Treatment.—On properties where the stomach worm is known to cause losses, it is well not to wait for the symptoms to show themselves before commencing treatment. A start should be made about September or October when pasture infestation is becoming heavy, whether the sheep have begun to show signs or not.

The following drench is recommended:—Dissolve ¼ lb. of clear blue crystals of copper sulphate in a pint of boiling water. When making the solution use a porcelain or enamelware dish, as bluestone will corrode most metals, and leads to a chemical change in the solution. Add to this enough cold water to make it up to three gallons, using non-metallic receptacles. The sheep should be starved at least overnight and up to 24 hours. The dose to be graded according to the age of the animals:—

Lambs 3 months to 12 months—½ to 1½ ounces of solution.

Sheep over 12 months—2 to 3 ounces of the solution.

Dose a few sheep a few days before going ahead with the main mob in order to check the accuracy of the solution. This is merely a safeguard against possible error, which might cause mortality.

A good method of giving the drench is to procure some empty olive oil bottles, take each separately and mark where the dose comes to on it, then take a file and file a hole in the bottle at that point so that it will hold no more than the correct amount when dipped in the vessel containing the solution. No water should be given to the sheep on the day they are dosed. Sheep should be held in normal standing position when drenched.

Drenching should be done about every six weeks throughout the summer. The copper sulphate drench has proved to be very effective against stomach worms (particularly *Haemonchus contortus*), and should be given to all sheep on the property. The stomach worm is very widely distributed throughout the State, but it is only in certain districts that the conditions are favourable for heavy infestations.

General control measures as indicated above should also be enforced.

3.—LUNG WORMS.

There are two main species of lung worm infesting sheep in this State. These are *Dictyocaulus filaria* and *Synthetocaulus rufescens*. The former is found commonly in Western Australia; the latter, being much more infrequently encountered, is relatively unimportant. *Dictyocaulus filaria* lives in the branches of the windpipe (bronchi). On opening up the "pipes" the worms may be seen as white threads up to four inches in length, in cases of heavy infestation occurring in a tangled mass. The other species is smaller, and is found in the terminal branches of the bronchi and the lung tissue itself.

Symptoms.—Young sheep again are chiefly affected. The worms cause broncho-pneumonia with a rather characteristic dry cough, and frequent expulsion of mucus. There may be also some difficulty in breathing. Unless numerous, lung-worms have no effect on general health of sheep, the cough being practically the only symptom noted. If infestation is heavy there is loss of condition, and the sheep may become emaciated and die.

The fatal pneumonia, due primarily to the lung-worm, seen frequently in sheep in some parts of Australia, appears to be uncommon in the West.

Where lung-worms are present, stomach worms are occasionally found in association, and it would appear that the former are often of secondary importance; so that when sheep so affected are treated for stomach worm, symptoms of parasiticism disappear.

Life History.—This is similar to that of the stomach worm. The eggs or young worms are coughed up by affected sheep reaching the exterior with bronchial secretion, or are swallowed and passed out with faeces, thus infecting pastures. In a short time the worms which are swallowed by sheep migrate up the gullet into the mouth, and thence down the windpipe.

Treatment.—The general measures of control already suggested should be adopted. There is no really satisfactory treatment for lung worms that can be applied by the farmer, though if valuable stock are badly infested, there are certain measures which can be taken by a veterinarian with, perhaps, some measure of success.

If lung-worms are present it is as well to give the sheep the bluestone drench, not that this (or any other known drench) will remove the lung-worm, but it will remove stomach worms which are also likely to be present, and which may be actually causing the emaciation.

4.—OTHER ROUND WORMS.

Chabertia ovina is in our experience the most common worm affecting sheep in Western Australia, being found in almost 100 per cent. of *post mortems* in the Southern part of the State. It is a stout white worm up to one inch in length. It is found in the large bowel, usually firmly attached to the lining. No detrimental effects have been noticed here following infestation with this worm.

The "nodular worm" (*Oesophagostomum*) is occasionally met with. This worm gives rise to a condition of "pimply gut"—small nodules from the size of a pin head to that of a pea, being found in the large bowel. These nodules contain the larvae of the worm.

5.—TAPE WORMS.

There are numerous species of tape worms affecting sheep, which also harbour cysts or "bladders" of some species including hydatids. The mature worms are found in the intestines and, if numerous, segments may be obvious in the dung. The cysts are found commonly in the abdominal cavity and organs, and in the lungs.

As far as the sheep are concerned, tapeworms appear to be of quite minor significance, and their presence for all practical purposes has little effect on the general health of these animals.

6.—LIVER FLUKE.

It is noteworthy that the liver fluke does not exist in this State. It has been introduced here at different times in imported stock, but has never subsequently appeared in local sheep. Possibly this is due to the fact that the particular species of water snail required for the development of the parasite is not present in this State. The symptoms of stomach worm infestation are not unlike those due to chronic fluke infestation which accounts for the frequent opinion expressed by stock owners that their sheep are infested with liver fluke—in reality the trouble is probably due to stomach worms—certainly not to liver fluke.

BEE-KEEPING NOTES.

H. Willoughby Lance,
Apiculturist.

This should be a busy time of year for bee-keepers. In many districts brood-rearing has been going on for the past two months, and in some cases the busy bee will have got ahead of the bee-keeper, the hives overcrowded, and swarming taken place.

Any bee-keeper who has not gone through his hives should do so at once, as no time is to be lost if he wishes to make the best of what promises to be a good season in most districts. The notes in last quarter's *Journal* on Hives and Swarming should be re-read.

Every hive should be examined, and, if dirty or dilapidated, exchanged for a clean sound one. In every case the brood chamber should be examined. If the bee-keeper finds that there is an excess of pollen combs choking the brood chamber, some of these should be removed, leaving from one to three combs of pollen, according to the strength of the hive and the amount of pollen available in the district for the bees to gather. If other hives are short, some of these combs should be given them. If there is still a surplus of pollen combs and no use for same, anyone communicating with me will be put in touch with a good market for the same.

This is a most important time of year for the apiarist, very much depending upon his management of the colonies at this time as to whether they are able to take full advantage of the honey flow when it comes along. His slogan should be "Strong colonies and hardy bees."

With further reference to *Hives*. The floor board illustrated in last issue may only be suitable for apiarists who keep their bees in home apiaries. When hives require to be removed from one place to another, I use a detachable alighting board.

The floor is cut off flush with the front of the hive body, and two clips made of 1in. hoop-iron nailed to the front of the 3in. x 1in. jarrah battens, with the top edge 1½in. from the floor. The detached portion of the floor-board has two strips of ½in. hoop-iron nailed to its battens, being bent slightly so that they will just enter the slips like hooks. (Fig. No. 1 shows this arrangement.) Another method of attaching these landing boards is with dowels, as shown in Fig. 2.

With this device it is an easy matter, when the hives are to be removed and loaded into a truck, to unhook the landing-board and fix a strip of fly-wire straight across the entrance. There are no projections to take up room or interfere with the loading, and the detached landings can easily be carried in any odd corner.

As regards bodies, although I gave particulars of how to make these from petrol cases, I would not recommend them in preference to factory-made bodies, being made of well-seasoned wood ⅞in. thick with corners well fitted and made to standard. They can be purchased for 5s. each for a 10-frame body in the flat, and will outlast petrol-case bodies. All joints should be put together with paint.

Now, with further reference to *Swarm Prevention.* It must be remembered the swarming is usually due to congestion in the hive, either with honey or brood choking the combs, or with bees covering them.

It is not always realised that imperfect combs intensify swarming. If the comb sags or is damaged, there is a number of imperfect cells, and these may be used for storing honey, but never for brood-rearing. Combs that have cracked or broken within an inch or two of the top bar form a barrier to the brood nest, and the brood capacity may be reduced from 10 to 7 or 8 frames. The top portion of the frames contain honey only, and although there may be an empty super on top, the bees, and especially the queen, hesitate to pass over this rim of honey. It is, therefore, always desirable

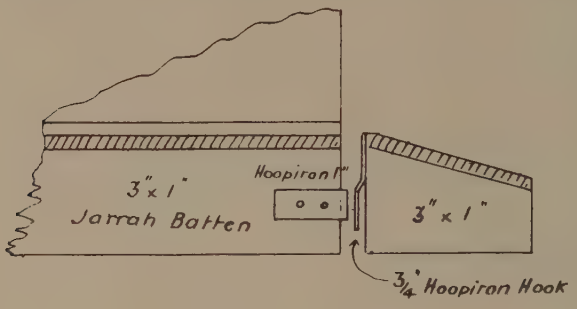


Fig 1.

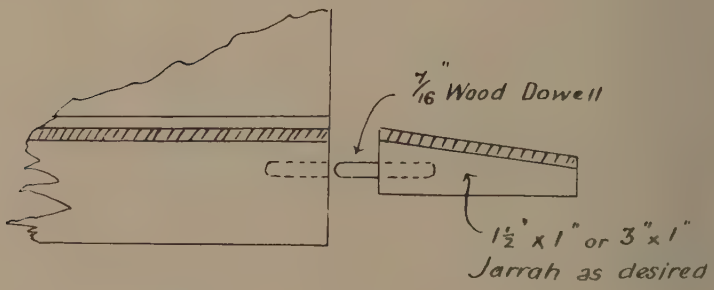


Fig 2

that especially the centre combs should have perfect worker cells right up to the top bar so that there is no contracting of the brood nest, and the queen and workers have no honey barrier to entering the second storey, causing congestion of bees in the brood chamber. Although there is plenty of room in the supers, the colony may be weak and will not pass the honey barrier, but crowds on to the brood combs.

Congestion is also brought about by weather conditions. Brood-rearing may be delayed. Good weather for nectar and pollen sets in, brood increases

rapidly, and the colonies have a very large proportion of young bees which, being too young for field work, crowd the brood chamber if there is no inducement to enter the second storey. This inducement can be given by removing two or three frames of brood with the adhering bees from the lower storey and placing them in the second storey, replacing them with frames of foundation or drawn comb.

Intermittent rainy weather is more productive of excessive swarming than good weather with plenty of honey coming in, provided the bees have room to store it. Many a colony can by careful management be carried through the season without swarming if most of the hive-workers can be induced to occupy the supers, and conditions are such that the field workers spend most of their time in the fields.

Where increase of colonies is desired, there is a great saving of time both to the beekeeper and the bees if this increase is brought about by building up strong hives full of bees, preferably on two storeys of brood combs, and dividing up or making nuclei from same.

The usual method if the hive is divided is to make the hive on the old stand the queenless portion, removing the portion with the old queen to a new location, or it may be placed at the side of the old hive, in which case some of the returning field bees will find their way into each portion. If the queenless portion is to breed its own queen, a comb of eggs or young larvae from the most desirable queen in the apiary should be placed therein, in which case it is best to remove the portion with the old queen to a new site so that the queenless hive gathers all the field bees to keep this hive as strong as possible, as there will be no emerging brood from the new queen for about six weeks. If a young queen is available for introduction or can be purchased, all this delay will be obviated, and the breeding continued without intermission.

Honey.—After the bee-keeper has done all possible in the matter of hives, queens, and swarming prevention, he will naturally expect some return for his labour, and the real object of all this is honey, which he hopes will be the best quality. He should, therefore, watch the flora in his neighbourhood, and make himself acquainted with the source of his honey, occasionally sampling the honey stored in the combs so that if he finds that a poor or strong honey is stored in the early season, and that later there is prospect of, say, the wandoo or marri yielding a good surplus, it would be advisable to empty the supers before the wandoo and marri come in. If he is in a jarrah district he will probably find that the jarrah flow is finished by about Christmas, and he can take off the surplus leaving empty combs for any later flow. In my own district I usually get three or four distinctly different honeys during the year, which I endeavour to keep separate.

Beginners often have a great idea of producing comb honey in one-pound sections, and are greatly disappointed when, after having them on the hive for two or three months they find little or no honey in them. The production of comb honey is not an easy matter, and should not be attempted by a beginner but left until he understands more of the economy of the hive and the habits of the workers. I will deal with this on another occasion. If comb-honey is desired for home use, half-depth frames can be used in the supers and the comb cut out.

PEANUTS.

J. C. Palmer, Dip. Agr.,
Potato Inspector.

There is a big demand for peanuts amongst the fruiterers and merchants of Perth, more especially now the Commonwealth Government has placed restrictions on their import from Java and China. The roasted peanut is a very popular delicacy with certain sections of the public, large quantities of the raw nut are used used by the confectionery trade, and in addition valuable oils can be expressed from the nuts. This oil is used in the manufacture of oleo-margarine and in the United States, one of the countries where the pea-nut is grown extensively, large quantities are used annually. Peanuts can be grown in Western Australia though so far large acreages have not been planted. In the 1925-26 season only 3 acres were planted and a yield of 57 bushels was obtained. The local produce is, however, of quite a high quality and flavour, so that market gardeners and potato growers should find this crop worthy of their consideration.

The peanut belongs to a family of plants called legumes and shares with the other members of the family the peculiar property of absorbing nitrogen from the air. This nitrogen is drawn from the atmosphere and becomes converted by bacteria in nodules on the roots into plant food. As the vines die down the roots are left in the soil and consequently supplies of nitrogenous plant food are left in the soil for subsequent crops. Apart from any other considerations therefore, the cultivation of peanuts tends to increase the nitrogen content of the soil. Nitrogen forms the basis of one of the most important of plant foods and is usually supplied to the soil in the form of sulphate of ammonia a very costly manure. The soil is still more enriched—at the expense of the atmosphere—if the haulms are fed to stock on the paddock, or better still if the haulms are ploughed in after the nuts have been harvested.

According to the chemical analysis peanut haulms have a better food content than meadow hay. The kernel or nut has a very high feeding value since it contains generally about 29 per cent. of protein (nitrogenous feeding material) 49 per cent of fat and 14 per cent. of carbohydrates.

The peanut grows on low bushy plants with leaves like those of the Clover. It has an interesting peculiarity. The flowers after they have been fertilised, turn into pods and then the flower stalks with the bunch of immature pods bend over to the ground. The elongation of the end of the flower stalk and the whole of the cluster of young pods enter the ground, where they mature in close bunches. One or more seeds or nuts will form in each pod.

Seed and Cultivation.—The seed should be obtained from a reliable seedsman for most of the peanuts exposed for sale have been roasted. Roasting, of course, will kill the germination of the seed. The seed can be planted in the shells or husks but a more rapid germination will be obtained by shelling. When shelling, care must be taken not to rupture the skin of the nut. Only those shells which are well-grown and shapely should

be selected for planting, and it is better to choose shells which contain two or more nuts in them. Whole seed (40-50lbs) or from 8-10 lbs of shelled nuts will plant an acre. This seed is priced at about 1s. per lb. The seed can be sown in the furrows, planting every third furrow or, say, at a distance of 3 feet between the rows and placed about 12 inches in the row at a depth of not more than 3 inches. In the United States the seed is planted with a maize planter. Under favourable conditions the seed should germinate in 7 to 12 days, and the crop should be ready for harvesting after about four months.

The soil must be left loose on top and thorough cultivations with horse scarifiers will keep the weeds down.

The plants do better if they are slightly hilled up. It is unwise to cultivate after the flowering organs of the plants have penetrated the soil and when the vines have spread between the rows.

It is usual to plant about September for then weather conditions are the most favourable.

Soil.—The main requirement is that the soil is of a free nature though the crop will grow in almost any type of soil. Though the upper layer must be well pulverised, it is not advisable to work the soil too deeply for the nuts tend to bury themselves and will be left behind in the digging unless great care is taken. The best peanuts grow in the lighter soils, for in such soils the shells have the rich golden yellow colour which the merchants prefer. Good potato land is excellent, and might be occasionally rotated with peanuts.

Manuring.—The most important plant foods for this crop are phosphoric acid and potash. It is not necessary to supply much nitrogen for the crop will obtain the bulk of its supplies of nitrogen from the air. The ordinary mixture supplied by the merchants for peas or beans is quite suitable for peanuts. A still better mixture is that known as "orchard mixture" which is put up by the Mount Lyell or Cuming Smith companies. This mixture contains a high percentage of potash (5 per cent.) and a fairly low nitrogen content. The manure can be applied as though one were manuring a potato crop—in the furrow at about the same rate.

Harvesting.—Peanuts are ready for harvesting when the vines begin to turn yellow and to dry up, more especially when the weather conditions are dry and warm. If the pods are not allowed to mature thoroughly before harvesting they will shrink in storage and the nuts will have a shrivelled appearance. Further, the nuts in green and unripe pods are less oily and are not of the same feeding value as those in the riper maturer shells.

In small areas it is better to dig the crop with a potato fork. When dealing with a large area the peanuts can be ploughed out, provided that the plough is set deep down, enough to cut the tap roots of the plants without injuring the pods which lie in clusters just under the soil. After the vines have been dug and laid in windrows they should be left to cure and dry in the sun. The rows can be turned occasionally to insure a thorough ripening and curing of the crop. When cured the nuts may be gathered into bran bags, carted to a shed and left for some while. This

will minimise the chances of the kernels turning musty. Finally the crop is graded into sacks for disposal to the markets. The vines which are left in the paddock may be eaten off by stock or ploughed in.

There is machinery used in America for removing the shells from the plants but generally they are removed by hand. Hand shelling costs about 1s. per bushel. A yield of about 50 bushels per acre is often obtained and good peanuts will realise about 6d. or 7d. per lb. on the present market.

Varieties.—There are several varieties grown but most of them can be classed as white or red. The white are more spreading in habit and the red usually mature more slowly but give better returns. Well-known varieties are Small Spanish, Valencia, the Large Virginian and the Mammoth Bush.

SHOW AND FIELD DAY DATES, 1928.

Dalwallinu	Friday	Sept. 7,	1928
Jennapullin	Wednesday...	Sept 12	
Doodlakine	Wednesday	Sept. 12	
Wyalkatchem	Friday	Sept. 14	
Meckering	Friday	Sept. 14	
Dowerin	Wednesday	Sept. 19	
Bruce Rock	Wednesday	Sept. 19	
Three Springs	Thursday	Sept 20	
Quairading	Thursday	Sept. 20	
Northampton	Thursday	Sept. 20	
Tammin	Friday	Sept. 21	
Goomalling	Friday	Sept. 21	
Mt. Marshall	Saturday	Sept. 22	
Greenough	Tuesday	Sept. 25	
Northam	Tuesday and Wednesday ...	Sept. 25	and 26
Corrigin	Wednesday	Sept. 26	
Geraldton	Thursday and Friday	Sept. 27	and 28
Kellerberrin	Friday	Sept. 28	
Avondale, Field Day ...	Saturday	Sept. 29	
Nungarin	Saturday	Sept. 29	
Kulin	Saturday	Sept. 29	
Lake Grace	Saturday	Sept. 29	
Wongan Hills	Tuesday	Oct. 2	
York	Wednesday	Oct. 3	
Merredin	Thursday	Oct. 4	
Moora	Thursday	Oct. 4	
Perth Royal	Tuesday, Wednesday, Thursday, Friday and Saturday	Oct. 9	to 13
Chapman, Field Day ...	Saturday	Oct. 13	

SHOW AND FIELD DAY DATES, 1928—*continued.*

Beverley	Tuesday	Oct.	16
Harrismith	Tuesday	Oct.	16
Pingelly	Wednesday	Oct.	17
Calingiri	Wednesday	Oct.	17
Narrogin	Thursday and Friday	Oct.	18 and 19
Merredin, Field Day ...	Friday	Oct.	19
Drakesbrook	Saturday	Oct.	20
Ghooli, Field Day ...	Saturday	Oct.	20
Byford	Saturday	Oct.	20
Nyabing	Saturday	Oct.	20
Wickepin	Tuesday	Oct.	23
Gnowangerup	Wednesday...	Oct.	24
Harvey	Wednesday	Oct.	24
Toodyay	Wednesday	Oct.	24
Salmon Gums, Field Day	Friday	Oct.	26
Wagin	Friday	Oct.	26
Kelmscott	Saturday	Oct.	27
Kukerin	Monday	Oct.	29
Tambellup	Tuesday	Oct.	30
Katanning	Thursday and Friday	Nov.	1 and 2
Wongan Hills, Field Day	Friday	Nov.	2
Canning	Saturday	Nov.	3
Mt. Barker	Saturday	Nov.	3
Bunbury	Wednesday and Thursday ...	Nov.	7 and 8
Koojnup	Friday	Nov.	9
Upper Blackwood... ...	Thursday	Nov.	15
Karridale	Saturday	Nov.	17
Catterick	Saturday	Nov.	17
Donnybrook	Wednesday...	Nov.	21
Bridgetown	Friday	Nov.	23
Margaret River	Saturday	Nov.	24
Manjimup	Wednesday	Nov.	28
Albany	Thursday and Friday	Nov.	8 and 9
Osborne Park	Saturday	Dec.	1
Busselton	Wednesday	Dec.	5
Wanneroo	Saturday	Jan.	21, 1929
Kalamunda	Monday	Jan.	28
Denmark	Wednesday	Feb.	
Coogee	Saturday	Feb.	16
Spearwood	Saturday	Feb.	23
Fremantle	Saturday	Mar.	2
Mandogolup			
Torbay			

HORTICULTURAL NOTES.

SEASONAL WORK FOR OCTOBER, NOVEMBER, AND DECEMBER.

Geo. W. Wickens,
Superintendent of Horticulture.

October.

Cultivation in the orchards needs every attention this month. Ploughing and cross-ploughing will have been completed in September, and the cultivator must be kept going unless prevented by rain. Should rain occur the cultivator should be used again as soon afterwards as the land is dry enough to work without becoming sticky.

The winter rainfall of 1928 has been well up to the average in all fruit-growing districts, and if the top soil from four inches to six inches in depth is kept in a thorough state of tilth during the summer months, sufficient soil moisture will be retained for tree growth and fruit production, even should the summer turn out more than usually dry.

The land around the trees which cannot be reached with the cultivator or other horse-drawn implements must be freed from weeds, and loosened with a digging fork or pronged hoe.

Young trees in newly planted orchards require special attention, and hoeing should be lightly done so as not to disturb the roots which are now making new growth.

Insect pests and fungus diseases feel the genial effects of spring this month and reproduce abundantly, needing constant watchfulness and care to keep them under control. If in doubt as to treatment communicate with your local orchard inspector.

Pear Scab and Powdery Mildew of the apple, amongst the fungi, and Fruit Fly and Orange Aphis, amongst the insect pests, are some of the most important requiring attention at this time of the year. With reference to the first-named—Pear Scab—a regrettable typographical error occurred in the Horticultural Notes for September in the last *Journal* (June, 1928), where in the line at the bottom of page 253 advice is given to use lime sulphur at a strength of "1lb." lime sulphur in 40 gallons of water—"1lb." should read "1 gallon."

November.

Continue cultivation.

Continue baiting and trapping for Fruit Fly and destruction of infested fruit.

Spray for Pear Slug this month, using 1½ lbs. arsenate of lead powder in 50 gallons of water.

The first of the new season's stone fruits will ripen this month in the warmer districts—"Edward VII.," "Bell's November," and similar varieties of peaches being fit for gathering before the 30th. These varieties, if not

well grown, are very poor in quality and appearance, and winter pruning should have been done with the idea of restricting the trees' production by the removal of a large proportion of the fruiting wood: but no matter how carefully and well winter pruning is carried out, it will be found in a normal season that thinning the young fruits is essential if size and quality are to be obtained. This refers not only to the fruits above mentioned, but to the major portion of the kinds of fruit now being grown, and I know of no single operation in the work on the orchard that is so generally neglected as thinning out young fruits, nor one that pays better when it is efficiently done. Fruit is sold by the pound or case in Western Australia, and just as many pounds or cases will be gathered from a tree that has been judiciously thinned as from one that has been allowed to overcrop: one fruit on the thinned tree equalling in size and weight two, and sometimes even three, on the tree that has overcropped. But quite apart from the fact that the quantity harvested is nearly the same, the large sized, good quality fruit will always find a market and command a price where the small hard fruit, lacking in juice and appearance, is difficult to dispose of at any price.

In thinning stone fruits—peaches, apricots and plums—the operation should be delayed until the natural shedding has taken place. If it is done before, many fruits will be removed by hand that would have fallen naturally. The shedding mentioned will be finished with nearly all varieties early this month. No hard and fast rule can be laid down as to the number to take off; the usual advice with peaches and apricots is to space the fruits to about four inches between them, but the trees rarely fruit evenly enough to allow of this being made an absolute rule. However, they should be thinned so that room is allowed each fruit to develop to the full size for the variety without touching its neighbour, and when the fruit is borne on lateral willowy growths, as distinct from short stiff shoots, care should be taken not to allow more weight of fruit at the ends than the wood can carry.

Apples and pears grow in clusters, at times as many as five together, and as a general rule these should be thinned to two in each cluster, but the operator must exercise judgment in this matter according to whether the variety is small or large, and whether the fruiting spurs are close together or a fair distance apart.

For the grower who is a novice at thinning and fears, when he looks at the ground after he has been at work on a tree for some time, that he has sacrificed too much of the crop the best plan by far is to count the fruits he has left on one of the main limbs, and gauging the strength of the limb and vigour of the tree he will know by the number of fruits whether he has taken too many or too few, calculating what number of the variety in question is required to fill a case when they reach maturity. I may say here that the beginner nearly always errs on the side of leaving too many on the tree.

In thinning apples and pears which, as stated above grow in clusters, care must be taken to remove the fruits and leave the stems attached to the spurs. If the stems are taken off with the fruits, the whole cluster is weakened, and the remaining fruits are liable to fall at a later date. With practice it is comparatively easy to take hold of an apple and bend it upwards in such a way that the stem parts readily from the fruit, but this can be done only if thinning is being carried out when the fruits are still quite small, or are naturally long-stemmed varieties. If they are short-stemmed

like, for instance, "Jonathans," and the apples in the cluster are touching each other, it is nearly impossible to remove one with the fingers without endangering the safety of those left behind. A small pair of scissors with blunt points makes a useful tool; a lemon clips can also be used, or a sharp budding knife in skilful hands performs the work rapidly and well.

Keep a vigilant watch for traces of Codlin Moth, and report to the Department at once should any apples or pears show signs of having been tunnelled.

December.

Continue cultivation.

Complete the work of thinning out apples and pears.

Carry on the war against Fruit Fly.

Take special notice of, and report at once, everything that resembles Codlin Moth or its larvae.

Marketing will be the principal work in the stone fruit orchards this month, and the better the fruit is graded and packed the better will be the prices obtained. Grade evenly and never mix small and large, nor first and second class fruit in one case, and never send to market very inferior fruit, which depresses prices of good fruit, causes gluts and robs the pigs which should be kept on the orchard of their just dues. It is very rare that a glut of really good fruit occurs, but there is always a very limited market for rubbish.

WHEAT VARIETY TESTS, 1927.

CHAPMAN EXPERIMENT FARM.

D. R. Bateman,
Seedsman.

Yield Trials.

The method of conducting this experiment is identical with the "Junior Field Trial" of the Merredin Experiment Farm, as described in the "Journal of Agriculture" for March, 1927, Vol. 4, page 146, and is as follows:—"Each variety is planted with the farm seed drill 15 runs or tubes wide, but instead of, as in ordinary farm practice, each variety being sown through all the tubes or runs of the drill, it is sown through two of them only. The fertiliser applied and the rate of seeding were the same as those used for the main crops, and were 96 lbs. superphosphate (22 per cent.), and 45 lbs. seed per acre.

Each drill width is occupied by five varieties, with two rows of the well-known variety "Gluyas Early" planted on each side to act as control plots, and with which comparisons can be made. Each plot, as with the main Field Variety Trial, is 10 chains long.

Shortly after the germination of the seed this experiment plot was divided into 10 sections, each 87 links long, and two shorter buffer sections one at each end. Between each section there is a division 3 links wide, which was used as a pathway to facilitate observations being made during the course of the trial.

With the object of securing an indication of the ability of the varieties under trial to produce hay and grain, three of the short sections were reaped at the hay stage, and five of them harvested and thrashed for grain. The results in each case were compared with the outside control plots of "Gluyas Early." As the plots harvested are so small—1/640th of an acre—the results obtained cannot be accepted as reliable comparisons of the prolificacy of these varieties, but are useful, when the other characteristics are satisfactory, to indicate the desirability of including them in the usual Field Variety Trial.

The other two sections were allowed to remain in the field long after maturity in order to determine the strength of their straw, and their tendency to "shed."

In addition to the control variety—"Nabawa"—thirty varieties were included in this trial. Great care was taken with the preparation of this plot; double-gees (*Emex australia*) proved to be troublesome right up to the last cultivation, but were successfully eradicated with the disc cultivator

The experiment was planted in an ideal seed bed on the 25th May, and all varieties germinated well on the 2nd of June. Growth was fairly rapid at first, but with excessive rains during June and July several washes were noticed diagonally across nearly every plot; this retarded the growth somewhat, and was visible up till harvest time.

No frost of any importance was registered, and only a few varieties were infected with septoria sufficient to affect the grain yield.

Pink spotted grains were found in the following varieties:—C54 (Correll's No. 9x Minister), Ogilvie (Chapman 48), Ghurka P1713, Bena P1614, Alliance P1700, Patriot P1463.

The results obtained are as hereunder:—

GRAIN YIELDS.

Reg. No. P.	Name of Variety.	Average height when cut.	Grain Yields.					Average percentage of all Sections.
			Section A.	Section. C.	Section E.	Section G.	Section J.	
		ins.	ozs.	ozs.	ozs.	ozs.	ozs.	%
1432	Nabawa (Control) ...	42	7·25	11·50	16·00	16·25	12·00	100
1703	Mogul	43	9·00	14·25	23·77	15·75	11·75	111
...	C. 54 (Correll's No. 9 x Minister)	38	3·75	6·25	12·75	11·75	7·75	63
...	C. 56 (Currawa x Cowra 15)	37	9·75	14·25	24·75	19·50	14·25	123
...	C. 68 (Currawa x Gluyas Early)	42	6·25	11·00	20·75	15·25	13·50	100
1609	Nugget	40	9·25	13·25	19·00	16·50	11·75	104
1432	Nabawa (Control) ...	42	5·25	13·25	19·00	17·50	13·75	100
1432	Nabawa (Control) ...	42	9·75	11·75	17·25	17·00	15·25	100
1702	Empire	38	2·00	4·25	7·35	9·25	4·75	42
1711	Viceroy	38	7·75	10·75	13·75	15·75	9·50	86
...	C. 61 (Federation x Bunyip)	40	8·75	13·25	18·00	16·25	10·25	99
1192	Ford	40	13·50	15·00	20·00	21·25	21·75	135
1696	Confederation	37	12·25	12·75	17·75	18·75	14·00	111
1432	Nabawa (Control) ...	44	7·25	7·75	16·25	17·25	14·75	100
1432	Nabawa (Control) ...	43	10·50	11·25	16·75	20·75	17·75	100
...	Ogilvie (Chapman No. 48)	42	6·25	8·75	13·25	16·75	13·00	76
...	C. 63 (Nabawa x Gluyas Early)	42	11·25	15·00	12·75	11·75	16·25	88
1713	Ghurkha	32	11·25	11·25	11·75	13·25	15·00	82
1614	Bena	38	10·25	8·75	15·00	17·75	13·25	86
...	M. 3	40	12·25	14·25	25·25	24·00	15·25	120
1432	Nabawa (Control) ...	42	9·75	9·75	20·25	16·00	19·00	100
1432	Nabawa (Control) ...	40	8·75	15·25	15·25	23·25	14·25	100
1337	Gluyas Late	46	8·25	18·25	19·75	14·75	13·75	95
...	C. 47 (Minister x Toby's Tusk)	39	8·50	12·00	10·75	20·75	11·50	81
...	Bowes (Chapman No. 49)	38	7·75	11·75	17·75	20·25	11·50	88
1700	Alliance	35	13·00	16·75	11·00	17·75	16·50	95
...	C. 62 (Nabawa x Gluyas Early)	37	6·25	13·75	15·50	22·00	13·75	91
1432	Nabawa (Control) ...	39	11·75	14·00	20·25	21·75	14·75	100
1432	Nabawa (Control) ...	43	11·75	16·00	19·75	21·75	13·25	100
...	C. 59 (Nabawa x Bunyip) II.	42	17·75	18·75	25·75	26·25	15·25	119
...	M. 4	42	15·25	15·75	21·00	25·25	14·25	105
1697	Ranee	33	13·75	18·25	21·75	20·25	10·25	96
...	C. 46 (Minister x Toby's Tusk)	37	21·25	15·75	15·75	20·25	13·50	99
...	C. 60 (Nabawa x Bunyip) III.	38	14·25	19·75	25·75	28·50	16·00	119
1432	Nabawa (Control) ...	41	9·75	18·50	23·25	25·00	15·75	100
1432	Nabawa (Control) ...	41	14·75	21·75	22·50	24·50	16·25	100
...	C. 52 (Nabawa x Gluyas Early)	39	17·25	20·50	24·75	26·25	18·25	118
...	C. 51 (Toby's Tusk x Gluyas Early) ...	35	15·75	20·50	24·00	27·25	18·75	117
...	C. 69 (Warren x Bayah)	40	15·75	20·25	25·25	28·00	16·25	116
1463	Patriot	39	14·25	18·25	17·50	23·75	16·25	100
...	M. 5	42	18·25	18·25	24·75	24·25	19·75	116
1432	Nabawa (Control) ...	44	7·75	14·00	18·25	25·00	16·50	100

HAY YIELDS.

Reg. No. P.	Name of Variety.	Average height when cut.	Weight of Hay cured.			Average percentage of all Sections.
			Section D.	Section F.	Section I.	
		ins.	lbs.	lbs.	lbs.	%
1432	Nabawa (Control)	42	2·25	3·00	2·50	100
1703	Mogul	41	2·75	4·75	3·50	116
...	C. 54 (Correll's No. 9 x Minister) ...	36	3·25	3·75	3·50	111
...	C. 56 (Currawa x Cowra 15)	37	3·75	4·75	3·50	126
...	C. 68 (Currawa x Gluyas Early) ...	40	3·75	5·50	3·75	137
1609	Nugget	44	3·25	4·50	3·50	118
1432	Nabawa (Control)	42	3·25	4·50	2·50	100
1432	Nabawa (Control)	44	3·00	3·00	2·00	100
1702	Empire	38	2·75	4·00	2·75	125
1711	Viceroy	34	3·00	4·25	2·75	131
...	C. 61 (Federation x Bunyip)	40	2·50	4·25	2·25	118
1192	Ford	46	3·00	4·20	3·50	144
1696	Confederation	39	2·75	4·50	2·75	131
1432	Nabawa (Control)	46	1·75	3·50	2·00	100
1432	Nabawa (Control)	44	2·25	3·00	2·00	100
...	Ogilvie (Chapman No. 48)	41	3·25	5·50	3·75	161
...	C. 63 (Nabawa x Gluyas Early) ...	45	3·00	3·50	2·50	116
1713	Ghurkha	36	2·25	3·25	2·50	103
1614	Bena	40	3·00	4·25	2·50	126
...	M 3	40	3·50	5·25	2·25	142
1432	Nabawa (Control)	45	2·25	4·00	2·00	100
1432	Nabawa (Control)	45	2·50	3·50	2·25	100
1337	Gluyas Late	50	3·75	5·00	3·00	138
...	C. 47 (Minister x Toby's Tusk)... ...	44	3·00	3·00	2·50	100
...	Bowes (Chapman No. 49)	40	3·00	4·50	3·25	126
1700	Alliance	38	3·00	3·00	2·50	100
...	C. 62 (Nabawa x Gluyas Early) ...	42	3·25	3·75	2·00	106
1432	Nabawa (Control)	46	3·00	4·00	1·75	100
1432	Nabawa (Control)	46	2·75	3·00	2·00	100
...	C. 59 (Nabawa x Bunyip) II.	40	3·75	3·25	2·50	121
...	M. 4	46	3·00	3·00	2·75	111
1697	Ranee	35	3·25	3·00	2·50	111
...	C. 46 (Minister x Toby's Tusk) ...	42	3·25	2·75	2·50	105
...	C. 60 (Nabawa x Bunyip) III.... ...	41	4·00	3·50	3·00	132
1432	Nabawa (Control)	46	3·25	2·75	2·00	100
1432	Nabawa (Control)	46	3·50	3·25	2·50	100
...	C. 52 (Nabawa x Gluyas Early) ...	42	4·00	3·75	3·00	132
...	C. 51 (Toby's Tusk x Gluyas Early) ..	40	4·25	3·50	3·00	132
...	C. 69 (Warren x Bayah)	44	3·50	3·25	2·50	112
1463	Patriot	40	4·25	3·25	3·25	132
...	M. 5	46	5·25	4·25	3·50	158
1432	Nabawa (Control)	44	3·25	3·25	1·75	100

BRIEF NOTES ON CHARACTERISTICS OF EACH VARIETY.

Alliance P1700.

Type.—White, square-tipped ear, bald, fairly short, stout straw that stands well, indifferent for hay, does not shed.

Diseases.—Susceptible to bunt, septoria on stem and ears moderate; spring rust on leaf blade very bad; summer rust on stem bad.

Maturity early.

Bena P1614.—A considerable amount of comment has been passed upon the good yielding qualities of this variety, but up to the present no extraordinary yields have been officially recorded; stools very well, but no better than Yandilla King under the same conditions.

Type.—Brown, slightly tapering ear, tip awned; straw stout and stands fairly well; not very suitable for hay, but should yield well; shed very little in this trial.

Diseases.—susceptible to bunt; septoria on stem and ears very slight; spring rust on leaf blade moderate, summer rust on stem bad.

Maturity midseason.

Bowes C49.—A variety that gave good promise at Merredin Experiment Farm when under trial in the Junior Field Trial there, but has not come up to expectations here.

Type.—White, tapering ear; tip awned; stout straw that stands fairly well; only fair hay qualities; grain poor, dark, discoloured; sheds slightly.

Diseases.—Susceptible to bunt; spring rust bad on leaf blade; summer rust very bad on stem.

Maturity midseason.

C46 (*Minister x Toby's Tusk II.*).—A variety that promised well in the Test Row plantings for both hay and grain.

Type.—White, tapering ear; tip awned; tall medium straw of good hay qualities, sheds rather badly; good sample of grain.

Diseases.—Resistant to bunt; septoria on stem and ears moderate; spring rust on leaf blade moderate; summer rust on stem slight.

Maturity midseason, slightly earlier than Nabawa.

C47 (*Minister x Toby's Tusk III.*).—A good hay variety, but failed to yield up to expectations for grain.

Type.—White, slightly tapering ear; tip awned; tall medium straw that stands fairly well; good hay variety; sheds rather badly.

Diseases.—Susceptible to bunt; spring rust on leaf blade bad; summer rust on stem moderate.

Maturity midseason.

C51. (*Toby's Tusk x Gluyas Early III.*).—A promising variety that yielded well for both hay and grain.

Type.—White, square-tipped ear; tip awned; medium stout straw; fairly good for hay; sheds very little.

Diseases.—Very susceptible to bunt; septoria on stem and ears very slight; spring rust on leaf blade moderate; summer rust on stem slight;

Maturity early.

C52 (*Nabawa x Gluyas Early IV.*).—A promising variety that yielded well for both hay and grain.

Type.—Brown, tapering ear; tip awned; medium straw that stands fairly well; good hay quality; does not shed.

Diseases.—Very susceptible to bunt; septoria on stem and ears very slight; spring rust on leaf blade bad; summer rust on stem very slight.

Maturity early.

C54 (*Correll's No. 9 x Minister*).—A disease-liable variety of no value for either hay or grain; very late and useless.

Type.—White, club-head ear; tip awned; stout, short straw that stands very well; poor hay quality; does not shed.

Diseases.—Very susceptible to bunt; septoria on stem and ear slight; spring rust on leaf blade bad; summer rust on stem very bad.

Maturity very late. Discarded.

C56 (*Currawa x Cowra* 15).—A promising variety for grain with fair hay yielding qualities.

Type.—White, clubbed ear; tip awned; fairly tall, stout straw that stands fairly well, only attained medium height under field conditions, fair hay qualities; does not shed.

Diseases.—Very susceptible to bunt; septoria present on stem and ears very slight; spring rust on leaf blade very slight; summer rust on stem moderate.

Maturity late.

C59 (*Nabawa x Bunyip II.*).—A very promising dual purpose variety very similar to Nabawa but slightly earlier.

Type.—White, tapering ear, with short tip awn; tall in the straw; stands well in the Test Row plantings, but lodged rather badly under field conditions, straw stout; fairly good hay qualities; does not shed.

Diseases.—Fairly resistant to bunt; septoria very slight on stem and ears; spring rust on ear blade and summer rust on stem plentiful.

Maturity early.

C60 (*Nabawa x Bunyip III.*).—A similar type to C59; both yielded well for hay and grain.

Type.—White, tapering ear, with short tip awn; medium straw that stood well in Test Row planting, but went down rather badly under field conditions; fairly good hay qualities; does not shed.

Diseases.—Very susceptible to bunt; septoria on stem and ears very slight; summer rust on stem plentiful.

Maturity early.

C61 (*Federation x Bunyip III.*).—A variety that at first showed promise in Test Row plantings, but failed under field conditions for both hay and grain; also very poor this season in Test Row planting.

Type.—Brown, tapering ear, bald; medium straw that stands fairly well, although tall; fairly good for hay but weighs light.

Diseases.—Fairly resistant to bunt; septoria on stem and ears very slight; very badly affected with spring rust on leaf blade; summer rust on stem plentiful.

Maturity midseason.

C62 (*Nabawa x Gluyas Early II.*).—A similar type to C52 but does not yield so well for either hay or grain; slightly later.

Type.—Brown, tapering ear, tip awned; medium straw that stands fairly well; fairly good hay qualities; does not shed.

Diseases.—Very susceptible to bunt; septoria on stem and ears slight; spring rust on leaf blade very plentiful; summer rust on stem plentiful.

Maturity midseason. Discarded.

C63 (*Nabawa x Gluyas Early III.*).—A promising variety that did not yield up to expectations for either hay or grain; similar to C62 and C52, but white glumed.

Type.—White, tapering ear, tip awned; fairly tall, medium straw that stands fairly well; rather good hay qualities; does not shed.

Diseases.—Very susceptible to bunt; septoria on stem and ears very slight; spring rust on leaf blade slight; summer rust on stem plentiful.

Maturity midseason. Discarded.

*C*68 (*Currawa x Gluyas Early II.*).—A fairly good hay variety that failed to come up to expectations for grain.

Type.—White, tapering ear, tip awned; tall, medium to stout straw that stands well; god hay qualities.

Diseases.—Very susceptible to bunt; septoria present on stem and ear slight; spring rust on leaf blade very slight; summer rust on stem plentiful.

Maturity late.

*C*69 (*Warren x Bayah*).—A variety that yielded well above expectations and far better than was estimated; it was most disappointing all through growth but yielded splendidly for grain.

Type.—White, square tipped ear, bald but rather compact; straw medium stout, stands well; better for grain than hay; sheds a little.

Diseases.—Susceptible to bunt; septoria on stem and ears very slight; spring rust on leaf blade very plentiful; summer rust on stem plentiful.

Maturity early.

*Confederation P*1696.—A grain variety from Werribee, Victoria, that showed promise in Test Row planting.

Type.—White, slightly clubbed ear, tip awned; stout straw that stands well; indifferent hay qualities; sheds a little.

Diseases.—Susceptible to bunt; septoria on stem and ears very slight; spring rust on leaf blade very plentiful; summer rust on stem plentiful.

Maturity early.

*Empire P*1702.—A short-strawed variety received from Werribee, Victoria, in 1925, and was included in the Junior Field Trial, as much was expected from these varieties.

Type.—Brown, slightly clubbed ear, tip awned; short stout straw that stood well in Junior Field Trial, but went down badly in Test Row planting; indifferent for hay; does not shed.

Diseases.—Very susceptible to bunt, spring rust on leaf blade plentiful; summer rust on stem plentiful.

Maturity midseason. Discarded.

*Ford P*1192.—A tall growing dual purpose variety, but sheds rather badly.

Type.—White, tapering ear, tip awned; tall, medium stout straw that stands fairly well, yields well for hay and of good quality; good for grain, but sheds rather badly.

Diseases.—Spring rust on leaf blade moderate; summer rust on stem slight.

Maturity midseason.

*Ghurkha P*1713.—A variety received from Werribee, Victoria, in 1925; does not yield well for either hay or grain; possesses a good stiff short straw.

Type.—Brown, square tipped ear, tip awned; short stout straw that stands well; very poor hay qualities; does not shed.

Diseases.—Resistant to bunt; loose smut on several plants; septoria on stem and ears slight; spring rust on leaf blade moderate; summer rust on stem moderate.

Maturity midseason. Discarded.

*Gluyas Late P*1337.—A tall growing variety suitable for hay, but does not yield well for grain.

Type.—Brown, tapering ear, tip awned; tall fairly stout straw that is inclined to go down; good hay variety; does not shed.

Diseases.—Fairly susceptible to bunt; spring rust on leaf blade bad; summer rust on stem moderate.

Maturity midseason. Discarded.

*M*3 (*Toby's Tusk x Nabawa.*)—A tall growing variety that yielded well both for hay and grain.

Type.—White, slightly clubbed ear, tip awned; tall, stout straw that stands fairly well, good hay qualities; yielded good sample of grain; sheds a little.

Diseases.—Moderately susceptible to bunt; spring rust on leaf blade bad; summer rust on stem very bad.

Maturity midseason.

*M*4 (*Steinwedel x Cedar*).—A very fair dual purpose variety, but is rather weak in the straw.

Type.—White, clubbed ear, tip awned; fairly tall, stout straw, but goes down badly; good hay qualities; does not shed.

Diseases.—Septoria on stem and ears slight; spring rust on leaf blade plentiful; summer rust on stem moderate.

Maturity early.

*M*5 (*Huguenot x Bunyip*).—A tall growing early variety that is better suited for hay than grain.

Type.—White, tapering ear, tip awned; medium straw that stands very well; good hay qualities, but sheds far too badly to be of any value for grain.

Diseases.—Fairly resistant to bunt; septoria on stem and ears slight; spring rust on leaf blade bad; summer rust on stem slight.

Maturity early.

*Mogul P*1703.—A variety that was received from Werribee, Victoria, in 1925, and showed fair promise in Test Row plantings.

Type.—Brown, square tipped ear, tip awned; fairly tall stout straw that stands fairly well; fairly good hay qualities; sheds rather badly.

Diseases.—Very susceptible to bunt; spring rust on leaf blade bad; summer rust on stem bad.

Maturity late. Discarded.

*Nugget P*1609.—A late variety that failed to yield up to expectations from results in Test Row plantings.

Type.—White, square tipped ears, with slight tip awn; fairly tall, stout straw that stands well; fairly good for hay; sheds slightly.

Diseases.—Very susceptible to bunt; septoria on stem and ears very slight; spring rust on leaf blade plentiful; summer rust on stem plentiful.

Maturity late, but slightly earlier than Yandilla King.

*Ogilvie C*48.—A variety that promised well at Merredin Experiment Farm, but has not come up to expectation; did not do very well here this season either in the Junior Field Trial or Test Row Plantings.

Type.—Brown, tapering ear, tip awned; fairly tall stout straw that stands fairly well; useful for hay; sheds slightly.

Diseases.—Moderately susceptible to bunt; septoria on head and stem very slight; spring rust on leaf blade moderate; summer rust on stem plentiful.

Maturity midseason.

*Patriot P*1463.—An early variety that did not yield up to expectations for grain.

Type.—White, tapering ear, bald, fairly tall medium straw; fairly good hay qualities, but sheds too much to be of any value as grain yielder.

Diseases.—The most susceptible variety for bunt at present under list; septoria on stem and ears slight; spring rust on leaf blade very bad; summer rust on stem very bad.

Maturity early.

*Ranee P*1697.—A short-strawed variety that did not come up to expectations in this year's test.

Type.—Brown, tapering ear, tip awned; stout straw that stands well; indifferent for hay; sheds rather badly.

Diseases.—Moderately susceptible to bunt; septoria on stem and ears slight; spring rust on leaf blade plentiful; summer rust on stem moderate.

Maturity early.

*Viceroy P*1711.—A variety received from Werribee, Victoria, in 1925, that failed to yield up to expectations.

Type.—Brown, tapering ear, bald; medium straw that stands fairly well; indifferent for hay; does not shed.

Diseases.—Very susceptible to bunt; septoria slight on stem and ears; spring rust on leaf blade slight; summer rust on stem moderate.

Maturity midseason. Discarded.

BUNT RESISTANCE.

Trials to determine the relative Bunt Resistance of some new varieties were conducted on similar lines to those carried out at the Merredin Experiment Farm.

The results arranged in order of relative susceptibility are as hereunder. The rate of infection of the Control—"Gluyas Early" is represented by 100 and freedom from infection by 0.

VARIETIES ARRANGED IN ORDER OF INFECTION COMPARED WITH CONTROL ROWS.

DEGREE OF INFECTION (0)—
P. 1511, Genoa ; P 1211, Kubanka ; P. 1713, Ghurkha.

DEGREE OF INFECTION (1–20)—
P. 1705, Nabob 5 ; P. 1773, Early Bird 10 ; P. 1756, Wardfir 12 ; P. 1635, Nizam, 13 ; P. 1451 (Bunge No. 1 x Emmer) 13 ; P. 1779, Bluestem (identified as "Nabawa") 19.

DEGREE OF INFECTION (21–50)—
P. 1741, Omrah 23 ; P. 1706, Krithia 25 ; P. 1709, Marmora 25 ; P. 1746, Minyip 25 ; P. 1715, Babakin 27 ; P. 1697, Ranee 27 ; P. 1512, Felix 27 ; P. 1714, Gallipoli 28 ; P. 1695, Sepoy 29 ; P. 1803, Ogilvie 29 ; P. 1727, Booroloo 35 ; P. 1696, Confederation 35 ; P. 1804, Bowes 36 ; P. 1614, Bena 40 ; P. 1182, Wandilla 40 ; P. 1188, Cowra 26, 42 ; P. 1700, Alliance 45 ; P. 1710, Rajah 50 ; P. 1786, Riverina 50.

DEGREE OF INFECTION (51–100)—
P. 1337, Gluyas Late 52 ; P. 1752 (Currawa x Minister) 52 ; P. 1637, Wannon 55 ; P. 1609, Nugget 56 ; P. 1736, Boono 56 ; P. 1785, Aussie 60 ; P. 1748 (Currawa x Minister) 60 ; P. 1536, Barwang 62 ; P. 1610, Akakomuga 67 ; P. 1602, Crossbred 78a 68 ; P. 1711, Viceroy 70 ; P. 1708, Mahratta 70 ; P. 1513, Onas 77 ; P. 1776, Dollar 77 ; P. 1461, Soutar's Early 79 ; P. 1750, Inderet 80 ; P. 1744, Dookie Delta 83 ; P. 1627, Waratah 84 ; P. 1754, Gluclub 86 ; P. 1601 Crossbred (No. 12) 87 ; P. 1702, Empire 87 ; P. 1449 Bunge No. 1 x 1 P. 4 87 ; P. 1777, Union 87 ; P. 1199, Sultan 87 ; P. 1728, Cadia 88 ; P. 1774, Duri 90 ; P. 1775, Bredbo 90 ; P. 1703, Mogul 91 ; P. 1729, Canimbla 92 ; P. 1606, Unnamed x Una 92 ; P. 1698, Capitol 93 ; P. 1712, Sterling 95 ; P. 1704, Sovereign 95 ; P. 1749 Federation x Nabawa 95 ; P. 1434, Booran (Control) 100 ; P. 1726, Bobin 100 ; P. 1787, Gluclub 102 ; P. 1382, Triumph 106 ; P. 1739, Exquisite 113 ; P. 1701, Parsee 116 ; P. 1755 Federation x 1878 118 ; P. 1770, Millard 121 ; P. 1463, Patriot 127.

NEW CROSSBREDS ARRANGED ACCORDING TO INFECTION AS COMPARED WITH CONTROL.

DEGREE OF INFECTION (0)—
C. 46 (Minister x Toby's Tusk III.) ; C. 55 (Jonathan x Minister I.) ; C. 74 (D.A.C. 4179 x Quality III.) ; C. 80 (Dindiloa x Nabawa (M)) ; C. 86 (Quality x Velvet Don III.) ; M. 11 (Comeback x Florence) ; M. 28 (Dindiloa x Nabawa I.) ; M. 29 (Dindiloa x Nabawa II.) ; M. 30 (Dindiloa x Nabawa III.) ;.

DEGREE OF INFECTION (1–20)—
M. 27 (Nabawa x Carrabin III.) 2 ; C. 77 (Florence x Carrabin (M)) 2 ; C. 73 (D.A.C. 4179 x Quality II.) 3 ; C. 79 (Fortune x Gluyas Early III.) 3 ; C. 81 (Florence x Nabawa (M)) 5 ; C. 57 (Currawa x Gluyas Early I.) 6 ; C. 76 (Minister x Toby's Tusk I.) 7 ; C. 60 (Nabawa x Bunyip III.) 9 ; M. 32 (Florence x Fortune) 9 ; M. 24 (Florence x Carrabin) 11 ; M. 33 (Florence x Nabawa) 11 ; M. 25 (Nabawa x Carrabin I.) 16 ; M. 26 (Nabawa x Carrabin II.) 20.

DEGREE OF INFECTION (21–50)—
C. 61 (Federation x Bunyip III.) 21 ; C. 59 (Nabawa x Bunyip II.) 23 ; M. 23 (Federation x Carrabin) 24 ; C. 70 (Federation x Bunyip IV.) 26 ; C. 65 (Huguenot x Indian V.) 29 ; C. 83 (D.A.C. 4179 x Nabawa II.) 32 ; C. 85 (D.A.C. 4179 x Nabawa IV.) 39 ; C. 69 (Warren x Bayah) 42 ; M. 31 (Gluyas Early x Nabawa), 47 ; C. 47 (Minister x Toby's Tusk II.) 50.

DEGREE OF INFECTION (51–100 AND OVER)—
C. 52 (Nabawa x Gluyas Early IV.) 52 ; C. 62 (Nabawa x Gluyas Early I.) 60 ; C. 63 (Nabawa x Gluyas Early III.) 63 ; C. 53 (Gluyas Early x Bunyip II.) 66 ; C. 68 (Currawa x Gluyas Early II.) 69 ; C. 56 (Currawa x Cowra 15) 72 ; C. 51 (Toby's Tusk x Gluyas Early III.) 77 ; C. 66 (Hd. Federation x Gluyas Early II.) 83 ; C. 64 (Indian 7 x Currawa) 84 ; C. 84 (D.A.C. 4179 x Nabawa III.) 85 ; C. 67 (Toby's Tusk x Nabawa III.) 92 ; C. 50 (Toby's Tusk x Gluyas Early I.) 102 ; C. 75 (Correll's No. 9 x Minister x Quantity I.) 103 ; C. 78 (Clubhead x Vindessa IV.) 110 ; C. 54 (Correll's No. 9 x Minister I.) 114.

WHEAT VARIETY TESTS, 1927.

MERREDIN EXPERIMENT FARM.

E. J. LIMBOURN,
Seedsman.

FLAG SMUT RESISTANCE.

This experiment was carried out as a means of gaining definite information regarding the resistance of wheat varieties to the attack of the disease—Flag Smut (Urocystis tritici).

It was originally intended to test each variety for a period of three years. Owing to the large number of new varieties received annually, it has been found impossible to do this. In order to keep the work up to date with regard to new varieties, and yet keep within the area allotted, it has been found necessary to condense the experiment by—

(1) Omitting varieties already tested that had given over 25 per cent. of infection. (For 1928 it is proposed to limit this to 20 per cent):

(2) Reducing the seeds planted per row to 50:

(3) Planting the seeds only ½ a link apart, thus making the rows only ¼ of a chain long:

(4) Reducing the space between the rows to 2 links instead of 2½ links.

(5) Omitting varieties that are included in the line resistance test, that is omitting all the main crop varieties.

The number of varieties tested during 1927 was 108, which included 31 unnamed crossbreds from the Chapman Experiment Farm, and 18 unnamed crossbreds from this farm.

The majority of the named varieties were received during the last three years, only twenty-six of them had been planted during the previous year's test, which consisted mainly of the older and better known varieties.

The seed for this experiment is infected in much the same way as for the Bunt resistance test. To obtain the spores of the disease, infected foliage is collected at harvest time from a diseased crop, and minced up finely into a powder. The material was supplied by Mr. Carne, Botanist and Plant Pathologist, Department of Agriculture, Perth. A spoonful (small) of this minced straw is placed in each packet of 50 seeds and the packet well shaken up. The spores adhere readily to the seed, but to ensure a maximum infection a small pinch of the minced straw is pressed into the soil with each grain, and also sprinkled along the row before covering the seed.

Planting was delayed until early in June, the soil being then in fairly good condition, free from weeds but inclined to be cloddy.

Germination was only fair, averaging about 80 per cent. due possibly to cloddy soil, although in some cases there was evidence of the seedling Foot-rot.

No evidence of Flag Smut could be found until early September when the plants began to break into ear. The first inspection was made about September 16th, when all diseased plants were pulled out. After being counted and noted in the Field Book the plants were burnt. Another inspection was made during November, the majority of the varieties being then mature. All diseased plants were again pulled out and counted. The diseased flag from these plants was then collected and placed in air-tight tins for future experiments, the remainder of the plant being burnt.

Taking the average percentage infection of the control rows for the two years, it is found that the infection for 1927 is considerably higher than for 1926. The rates were 35 per cent. in 1926 and 49 per cent. in 1927. It would appear therefore that the method of infecting the seed is quite satisfactory.

A comparison of the result for those varieties that have been included both years is given herewith—

A COMPARISON OF THE PERCENTAGE OF INFECTION WITH VARIETIES PLANTED BOTH YEARS.

"GLUYAS EARLY" = 100.

Reg. No.	Variety.	1926.	1927.	Reg. No.	Variety.	1926.	1927
		%	%			%	%
859	Baroota Wonder Early ...	0	0	226	Yandilla King	0	0
421	Bunyip	0	0	1710	Rajah (Victoria) ...	2	4
914	Caliph	0	6	1507	Clarendon	3	7
...	Carrabin	0	1	C46	(Minister x Toby's Tus	3	4
223	Florence	0	0	228	Comeback	3	0
1442	Geeralying	0	0	1696	Confederation	3	
M3	(Toby's Tusk x Nabawa)	0	6	920	Toby's Tusk	3	16
...	Nabawa	0	0	C52	(Nabawa x Gluyas Early)	5	74
M14	(Nabawa x Bunyip) ...	0	0	1038	Gresley	6	11
M18	(Federation x Bunyip)	0	4	1636	Gallipoli	9	21
M19	(Nabawa x Sunset) ...	0	0	1713	Ghurka (Victoria) ...	11	9
1194	Queen Fan	0	0	955	Newman's Early ...	12	5
1445	S. H. J.	0	0	1697	Ranee	17	12
1182	Wandilla	0	0	460	Federation	18	47

It will be noticed that most of the varieties which were resistant in 1926 were also resistant in 1927. There were 13 resistant varieties in 1926, and of these only 4 showed infection in 1927, the infection being only very light. Two varieties that were slightly infected in 1926 were quite clean in 1927, although in most of the other varieties the infection was heavier. In looking up the pedigree of some of the resistant varieties it was found that one variety "Improved Fife" had been used in the breeding of at least five of them. They were all either directly the result of crosses made by the late William Farrer, or can be traced back

to varieties bred by him. "Comeback," "Genoa," "Florence," and "Bunyip" are four Farrer crosses, and "Yandilla King" can be traced back to him through "Yandilla." "Nabawa," "Carrabin," and "Dindiloa" can be added to these as they include either "Bunyip" or "Florence" in their parentage. No means are now available of determining whether "Improved Fife" is or was actually resistant, but the above information is certainly interesting as pointing that way.

It is very evident that the resistance is very strongly inherited in the progeny of either "Bunyip" or "Florence." In testing the new crossbreds from both experiment farms it will be seen that 23 out of 34, having either one or other of these varieties in the parentage, were fully resistant, while 9 of the remainder came below 20 per cent.

Several of the Chapman crossbreds had been treated with copper carbonate before it was found possible to include them in the test. These were thoroughly washed and dried before being infected, but there is no evidence at present to show whether this treatment had any effect upon the results obtained.

"Genoa" and M.11 (Comeback and Florence), both of which have proved so resistant to Bunt, also appear amongst the resistant varieties in this test. "Baroota Wonder Early" and "Geeralying" both again show resistance. In view of their usefulness as hay varieties this is worth noting as the use of a resistant hay variety should do much to stop the spread of the disease.

The varieties arranged according to their susceptibility to Flag Smut are as hereunder. The rate of infection of the control—"Gluyas Early"—is represented by 100 and freedom from infection by 0.

DEGREE OF INFECTION (0)—

P. 859, Baroota Wonder Early; P. 421, Bunyip; P. 228, Comeback; P. 1696, Confederation; P. 1739, Exquisite; P. 223, Florence; P. 1749, (Federation x Nabawa); P. 1442, Geeralying; P. 1750, Inderet; P. 1511, Genoa; P. 1194, Queen Fan; P. 1182, Wandilla; P. 226, Yandilla King; P. 1432, Nabawa.

DEGREE OF INFECTION (1–20)—

P. 1437, Carrabin 1; P. 1710, Rajah (Victoria) 4; P. 1786, Riverina 4; P. 955, Newman's Early 5; P. 914, Caliph 6; P. 1769, Noongaar 6; P. 1445, S.H.J. 6; P. 1756, Wardfir 6; P. 1736, Boonoo 7; P. 1507, Clarendon 7; P. 1792, Joffre 7; P. 1704, Sovereign 7; P. 1695, Sepoy 7; P. 1183, Ghurka (Victoria) 9; P. 1776, Dollar 9; P. 1038, Gresley 11; P. 1744, Dookie Delta 12; P. 1697, Ranee 12; P. 1706, Krithia 12; P. 920, Toby's Tusk 16; P. 1774, Duri 17; P. 1429, Golden King 17; P. 1775, Bredbo 19; P. 1787, Gluclub (Smith & Sons) 20.

DEGREE OF INFECTION (21–50)—

P. 1636, Gallipoli 21; P. 1727, Boolaroo 21; P. 1729, Canimbla 21; P. 1754 Gluclub (Victoria) 22; P. 1726, Bobin 24; P. 1746, Minyip 31; P. 1773, Early Bird 32; P. 1699, Suvla 37; P. 1788, Cargo 43; P. 460, Federation 47; P. 1708, Mahratta 47; P. 1705, Nabob 49.

DEGREE OF INFECTION (51–100)—

P. 1785, Aussie 52; P. 1700, Alliance 52; P. 1440, Merredin 58; P. 1741, Omrah 59; P. 1789, Binya 63; P. 1609, Nugget 69; P. 1790, Bruce 71; P. 1709, Marmora 76; P. 1698, Capitol 85; P. 1777, Union 85; P. 709, Canberra 95; P. 1702, Empire 96; P. 1363, Gluyas Early (Control) 100; P. 1728, Cadia 108.

NEW CROSSBREDS ARRANGED ACCORDING TO COMPARATIVE PERCENTAGE OF CONTROL VARIETY.

DEGREE OF INFECTION (0)—

C54 (Correll's No. 9 x Minister); C. 59 (Nabawa x Bunyip); C. 60 (Nabawa x Bunyip); C. 61 (Federation x Bunyip); C. 62 (Nabawa x Gluyas Early); C. 64 (Indian 7 x Currawa); C. 65 (Huguenot x Indian 5); C. 68 (Currawa x Gluyas Early); C. 70 (Federation x Bunyip); C. 73 (D.A.C. 4179 x Quality); C. 74 (D.A.C. 4179 x Qaulity); C. 77 (Florence x Carrabin); C. 79 (Fortune x Gluyas Early); C. 80 (Dindiloa x Nabawa); C. 81 (Florence x Nabawa); C. 84 (D.A.C. 4179 x Nabawa); C. 85 (D A.C. 4179 x Nabawa); M.11 (Comeback x Florence); M. 14 (Nabawa x Bunyip); M. 19 (Nabawa x Sunset); M. 24 (Florence x Carrabin); M. 25 (Nabawa x Carrabin); M. 26 (Nabawa x Carrabin); M. 27 (Nabawa x Carrabin); M. 28 (Dindiloa x Nabawa); M. 29 (Dindiloa x Nabawa); M. 30 (Dindiloa x Nabawa); M33 (Florence x Nabawa).

DEGREE OF INFECTION (1–20)—

M. 31 (Gluyas Early x Nabawa) 3; C. 46 (Minister x Toby's Tusk) 4; C. 56 (Currawa x Cowra 15) 4; M. 18 (Federation x Bunyip) 4; M. 20 (Nabawa x Gluyas Early) 4; M. 23 (Federation x Carrabin) 4; M. 3 (Toby's Tusk x Nabawa) 6; C. 75 (Correll's No. 9 x Minister x Quality) 8; C. 67 (Toby's Tusk x Nabawa) 9; M. 21 (Natural x B. from Federation) 9; M. 32 (Florence x Fortune) 10; C. 53 (Gluyas Early x Bunyip) 18.

DEGREE OF INFECTION (21–50)—

C. 51 (Toby's Tusk x Gluyas Early) 21; C. 76 (Minister x Toby's Tusk) 24; C. 50 (Toby's Tusk x Gluyas Early) 26; C. 69 (Warren x Bayah) 26; C. 78 (Clubhead x Vindessa) 26; C. 63 (Nabawa x Gluyas Early) 45.

DEGREE OF INFECTION (51–100)—

C. 52 (Nabawa x Gluyas Early) 74; C. 66 (Hd. Federation x Gluyas Early) 75; C. 57 (Currawa x Gluyas Early) 80; "Gluyas Early" (Control) 100.

FLAG SMUT RESISTANCE TEST WITH "LINES" OF STANDARD VARIETIES.

To test the variation in resistance between the "lines" of the same variety, and the possibility of producing a resistant strain by selection, twenty-five plants were selected from each of the varieties grown in bulk on the farm.

The plants representing the "lines" were obtained from the selection rows of each variety, fifty grains from each plant being used for the test. These were infected with Flag Smut in the usual way.

In the case of the variety "Gluyas Early" 50 "lines" were selected from the bulk crop in order to ascertain whether there was a greater variation in the resistance between these "lines" than between those which had been subjected to continuous selection for some time. The results show that there was a greater variation. In the case of the "lines" from selected plants the variation ranged from 27 to 60, average 42, and in the case of the "lines" from the bulk crop the range was from 14 to 70, average 41.

The results obtained are as hereunder—

Gluyas Early.					Canberra.	Nabawa.	Merredin.	Noongaar.	Carrabin
Selected ears from Bulk Crop.				Plants from selection rows.					
Line	Percentage infected.	Line	Percentage infected.	Percentage infected.	Percentage infected.	Percentage infected.	Percentage infected.	Percentage infected.	Percentage infected.
1	37	26	30	53	32	0	25	6	0
2	28	27	48	29	37	0	24	0	0
3	38	28	53	50	47	0	20	4	0
4	57	29	28	32	47	0	19	0	0
5	31	30	43	51	49	0	40	4	0
6	33	31	31	42	59	0	21	0	3
7	42	32	28	40	54	0	18	4	0
8	32	33	56	34	34	0	21	0	0
9	28	34	24	60	34	0	21	4	0
10	37	35	39	42	50	2	17	8	0
11	35	36	63	51	37	0	16	0	0
12	44	37	37	47	37	0	28	0	0
13	44	38	54	39	44	0	19	0	3
14	35	39	47	27	44	0	21	0	0
15	27	40	43	43	29	0	33	10	0
16	27	41	59	38	33	0	41	4	0
17	37	42	53	47	34	0	36	0	6
18	57	43	45	33	37	0	28	0	0
19	60	44	37	37	31	0	28	0	0
20	39	45	41	47	28	0	29	0	0
21	32	46	70	53	55	0	27	4	0
22	14	47	45	53	47	0	21	0	0
23	37	48	31	43	49	0	23	0	0
24	61	49	25	41	38	0	25	10	0
25	57	50	39	44	37	0	33	0	0
Average ...		...	41	42	41	Much less than 1	25	3	Approx. ·5 %.

In this and previous trials with Flag Smut it has been the practice to allow the surplus material with which the grain is infected to remain with it until the seed is being planted, there is then serious risk of this light infected material being blown about, and as the disease is soil-borne, of spreading infection to locations where it is not desired.

A test made this season has shown conclusively that this surplus infected material is not at all necessary to ensure the infection of the grain under trial, and in future it will be sieved off.

BUNT RESISTANCE.

This experiment, which has been planted for several seasons, was originally dsigned to obtain definite information as to the resistance or liability of certain varieties to the attack of Bunt (Tilletia levis). Hav-

ing obtained definite information on this point regarding the older varieties in cultivation, it is now limited mainly to testing the resistance or liability of any new variety received.

It is planned on the same lines as the Flag Smut resistance test. There being little or no danger of wind-borne or soil infection with this disease, it can be safely planted with the main test rows. For this reason it is possible to make the rows 1 chain long, and plant 100 grains of each variety per row. Each year any variety with more than 20 per cent. infection when compared with the control variety is to be discarded. Varieties with less than 20 per cent. infection will be included in the following season's test and continued for at least three seasons unless the rate of infection rises above 20 per cent.

It will be noticed that very successful results have been obtained with the variety "Florence" as a parent. Six of the new crossbreds included in the test, with an infection of less than 20, are crosses with "Florence," and one other can be traced to "Florence" through the variety "Dindiloa." Only three crossbreds other than these are amongst those below 20.

The results obtained are as under—

VARIETIES ARRANGED IN ORDER OF INFECTION COMPARED WITH CONTROL ROWS.

DEGREE OF INFECTION (0)—
P. 1511, Genoa.

DEGREE OF INFECTION (1–20)—
P. 1713, Ghurka 14; P. 1705, Nabob 15.

DEGREE OF INFECTION (21–50)—
P. 1756, Wardfir 21; P. 1699, Suvla 23; P. 1744, Dookie Delta 30; P. 1706, Krithia 31; P. 1750, Inderet 32; P. 1709, Marmora 36; P. 1746, Minyip 39; P. 1727, Boolaroo 47; P. 1708, Mahratta 47; P. 1451, (Bunge No. 1 x Emmer) 49.

DEGREE OF INFECTION (51–100 and over)—
P. 1777, Union 52; P. 1774, Duri 54; P. 1695, Sepoy 55; P. 1785, Aussie 61; P. 1786, Riverina 61; P. 1736, Boonoo 65; P. 1627, Waratah 66; P. 1636, Gallipoli 67; P. 1775, Bredbo 70; P. 1773, Early Bird 71; P. 1711, Viceroy 71; P. 1726, Bobin 72; P. 1788, Cargo 73; P. 1739, Exquisite 76; P, 1614, Bena 76; P. 1710, Rajah 76; P. 1697, Ranee 76; P. 1790, Bruce 78; P. 1741, Omrah 78; P. 1792, Joffre 80; P. 1702, Empire 81; P. 1729, Canimbla 82; P. 1749, (Federation x Nabawa) 82; P. 1700, Alliance 88; P. 1429, Golden King 88; P. 1701, Parsee 89; P. 1789, Binya 89; P. 1787, Gluclub (Smith & Son) 92; P. 1463, Patriot 93; P. 1704, Sovereign 94; P. 1696, Confederation 95; P. 1182, Wandilla 97; P. 1703, Mogul 98; P. 1712, Sterling 98; P. 1698, Capitol 100; P. 1776, Dollar 100; P. 1434, Booran (Control) 100; P. 1609, Nugget 101; P. 1754, Gluclub (Victoria) 105; P. 1728, Cadia 107.

NEW CROSSBREDS ARRANGED ACCORDING TO INFECTION AS COMPARED WITH CONTROL.

DEGREE OF INFECTION (0)—
C. 73 (D.A.C. 4179 x Florence); C. 74 (D.A.C. 4179 x Florence); C. 80 (Dindiloa x Nabawa); C. 86 (Florence x Velvet Don).

DEGREE OF INFECTION (1–20)—
M. 11 (Comeback x Florence) 1; C. 79 (Fortune x Gluyas Early) 9; C. 77 (Florence x Carrabin) 10; C. 46 (Minister x Toby's Tusk) 13; C. 81 (Florence x Nabawa) 14; C. 65 (Huguenot x Indian 5) 15.

DEGREE OF INFECTION (21–50)—
C. 59 (Nabawa x Bunyip) 25; C. 60 (Nabawa x Bunyip) 31; C. 61 (Federation x Bunyip) 33; C. 84 (D.A.C. 4179 x Nabawa) 41; C. 85 (D.A.C. 4179 x Nabawa) 41; C. 70 (Federation x Bunyip) 47.

DEGREE OF INFECTION (51–100 and over)—

C. 52 (Nabawa x Gluyas Early) 51 ; C. 48 (Fortune x Gluyas Early) 62 ; C. 66 (Hd. Federation x Gluyas Early) 62 ; C. 49 (Fortune x Gluyas Early) 65 ; C. 69 (Warren x Bayah) 66 ; C. 76 (Minister x Toby's Tusk) 68 ; C. 83 (D.A.C. 4179 x Nabawa) 68 ; C. 62 (Nabawa x Gluyas Early) 74 ; C. 57 (Currawa x Gluyas Early) 76 ; C. 67 (Toby's Tusk x Nabawa) 81 ; C. 68 (Currawa x Gluyas Early) 81 ; C. 56 (Currawa x Cowra 15) 85 ; C. 51 (Toby's Tusk x Gluyas Early) 88 ; C. 64 (Indian 7 x Currawa) 90 ; C. 47 (Minister x Toby's Tusk) 91 ; C. 53 Gluyas Early x Bunyip) 94 ; C. 75 (Correll's No. 9 x Minister x Quantity) 95 ; C. 54 (Correll's 9 x Minister) 97 ; C. 78 (Clubhead x Vindessa) 97 ; C. 50 (Toby's Tusk x Gluyas Early) 106.

BUNT RESISTANCE—LINE RESISTANCE.

To observe the variation in resistance between the different strains or "lines" of a variety, an experiment was planted similar to the Flag Smut resistance test.

Two varieties "Nabawa" and "Carrabin" were used. Fifty seeds were planted per row, the seeds being taken from the same twenty-five plants ("lines") used for the Flag Smut test. Seed infection was carried out in the same manner as for the varietal resistance test, *i.e.*, the spores of five Bunt balls were used for each packet of 50 seeds. The results obtained are hereunder—

BUNT RESISTANCE TEST, 1927.

LINE RESISTANCE.

Line.	Carrabin.				Nabawa.			
	Clean Plants.	Infected Plants.	Total.	Percentage of Infection.	Clean Plants.	Infected Plants.	Total.	Percentage of Infection.
				%				%
1 ...	24	12	36	33	24	8	32	25
2 ...	21	8	29	27	21	10	31	32
3 ...	28	6	34	18	22	13	35	37
4 ...	25	10	35	29	26	12	38	32
5 ...	21	17	38	45	20	21	41	51
6 ...	30	9	39	23	22	16	38	42
7 ...	23	6	29	21	26	14	40	35
8 ...	21	4	25	16	25	16	41	39
9 ...	26	4	30	13	27	13	40	32
10 ...	23	14	37	38	24	12	36	33
11 ...	24	11	35	31	17	10	27	37
12 ...	25	9	34	26	19	20	39	51
13 ...	25	7	32	22	21	13	34	38
14 ...	24	8	32	25	25	17	42	45
15 ...	26	4	30	13	25	9	34	27
16 ...	30	7	37	19	24	19	43	44
17 ...	28	11	39	28	22	17	39	43
18 ...	35	6	41	15	22	18	40	45
19 ...	23	10	33	30	19	21	40	52
20 ...	23	7	30	23	24	15	39	38
21 ...	29	8	37	22	13	23	36	64
22 ...	15	8	23	35	17	18	35	51
23 ...	31	7	38	18	26	18	44	41
24 ...	24	4	28	14	15	22	37	59
25 ...	24	7	31	23	19	19	38	50
	Totals and Average	205	832	25	Totals and Average	394	939	42

It will be noticed that there is a wide difference between the Bunt resistance of the different lines of the same variety, and ranges from 13 to 45, average 25, in the case of "Carrabin," and from 25 to 64, average 42 in the case of "Nabawa." This indicates the possibility of improving the Bunt resistance of existing varieties by selection.

INFECTION WITH BOTH FLAG SMUT AND BUNT.

A trial was conducted in which the seed was infected with both Flag Smut and Bunt. The results showed—

(1) That it was quite possible to have both diseases in the same plant, and

(2) That this method was unsatisfactory as a means of testing the relative resistance of the varieties to either disease.

For instance, when infected with both diseases the percentage of plants found with Flag Smut was 14; when infected with Flag Smut only the percentage of diseased plants was 44; with Bunt the combined infection produced 60 per cent. diseased plants, and the infection with Bunt only 88 per cent.

"WATSONIA."

(*Antholyza aethiopica.*)

W. M. Carne and C. A. Gardner.

The plant described here is one of several known in this State as "Watsonia."

The name is used to include true Watsonias as well as *Antholyza.* They are South African plants and, like many other herbaceous perennials from that country, thrive in this State. Indeed South African bulbs, using the word in a general sense to include plants with corms or swollen rhizomes, are always liable to become weeds with us. Cape Tulip, Guildford Grass, Arum Lily, Freesia, Babiana, Ferraria, and others besides the Watsonias have already become naturalised weeds. In most cases they have spread from gardens in which they have been grown for their flowers.

Watsonia is well established from Bullsbrook south through the coastal areas. It particularly favours creeks and river flats, but is not at all particular. The better the soil and the better watered it is, the more the plant thrives. Where it has not yet become established care should be taken to keep it out or it may eventually occupy much good land and take possession of creeks through the south-west. The bulbs (really corms) are very tenacious of life and pulling up and stacking in heaps is not sufficient to kill them. They should be burnt. Constant cutting or hoeing the plants will eventually kill them but this method cannot be expected to be successful in one season.

Description of Plant.

A tall herbaceous plant attaining a height upwards of six feet. Corm usually depressed-globular, tunicated with latticed coats. Leaves distinctly two-ranked, the leafy part of the stem almost fan-like, leaves long, soft and bright green.

Flowers in terminal spikes, simple or rarely branched, the spikes 2-ranked, the spathe-valves small oblong and purplish. Flowers reddish, the tube yellow to orange-red, the limb scarlet, 2-3 inches long, curved, the segments unequal, the uppermost the longest. Fruit an almost globular capsule, beaked, with 2-4 orange-coloured seeds in each cell.

Explanation of Plate.

A. Habit. B. Corm. C. Front view of flower. D. Side view of same. E. Summit of style. A. and B. half natural size, C. and D. slightly less than natural size, E. much enlarged.

"Watsonia."
(*Antholyza aethiopica.*)

WHOLE WHEAT MEAL.

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Wheat, oats and maize belong to a class of foods known as cereals. They are the seeds of well known grasses which vary in food-producing properties, according to the effect of climate and variety of soil in which they are grown. Generally speaking, however, each contain nutritive ingredients—proteins, carbohydrates and mineral matter, with a small amount of water. Wheat contains more protein (flesh forming material) and carbohydrates (heat and energy producing) than oats and maize. Their respective constituents are shown in the following table:—

——	Water.	Protein (Gluten, etc.).	Fat.	Carbohydrate (Starch, sugar).	Cellulose (Bran, etc.).	Mineral Salts.
	%	%	%	%	%	%
Wheat ...	12·0	11·0	1·7	71·2	2·2	1·9
Oats	10·0	10·9	4·5	59·1	12·0	3·5
Maize	12·5	9·7	5·4	68·9	2·0	1·5

The grinding of cereals gives meals. A further table shows a comparison of their respective food values:—

——	Water.	Protein.	Fat.	Carbohydrates.	Cellulose.	Mineral Salts.
	%	%	%	%	%	%
Whole Meal ...	12·1	12·9	1·9	70·3	1·6	1·2
Fine (Wheat) Flour ...	13·0	9·5	0·8	75·3	0·7	0·7
Oatmeal ...	7·2	14·2	7·3	65·9	3·5	1·9
Rolled Oats ...	7·2	15·4	7·2	64·8	3·5	1·9
Maize Meal ...	11·4	8·5	4·6	72·8	1·4	1·3

It will be seen that the proportion of carbohydrate in each of the meals is larger than that of protein. Also that the amount of protein in whole meal is greater than that of fine flour.

Considering the important part that flour plays in the list of food materials a brief description of the grain from which it is derived may be interesting. If a grain of wheat is examined under a microscope it will be found to consist of the following parts:—

1. The germ or embryo—rich in protein and fat.
2. The kernel or endosperm—consisting of masses of nutritive material found in delicate "honeycombed" cells, particles of gluten filling up the spaces.
3. The bran—the outer envelope—composed chiefly of cellulose, mixed with mineral matter.

Compare the food composition of its different parts:—

	Bran.	Kernel.	Germ.	Whole Grain.
	%	%	%	%
Water	12·5	13·0	12·5	14·5
Protein	16·4	10·5	35·7	11·0
Fat	3·5	0·8	13·1	1·2
Starch	43·6	74·3	31·2	69·0
Cellulose	18·0	0·7	1·8	2·6
Mineral Salts	6·0	0·7	5·7	1·7

Principally because of the difficulty of grinding the whole of the grain to a fine powder, during the process of milling, the outer coating of bran and also the germ is removed, hence the fine white flour of commerce has lost a great deal of its food value. In the days of stone grinding of wheat the bran was fanned away but the germ was left. This flour however did not keep as well as the present day white flour on account of the large proportion of fat contained in the germs. Present day milling then, produces a flour which, although lacking in protein, cellulose and mineral salts, is rich in carbohydrates and possesses also properties which recommend it for commerce. The fact that nourishing materials have been removed from white flour makes it appear that white bread is inferior to brown or whole bread. But it is not always the food that contains the highest percentage of nourishing material which is the most valuable, but the one that contains these constituents in a form capable of being absorbed. Coarse flours contain more protein and fat but owing to the amount of crude fibre or cellulose they are not as easily assimilated, and according to Doctors Hutchinson on Food (London), Snydes of Minnesota and Wood and Merrill of Maine, U.S.A., they really furnish less nourishment than is obtained from fine grades of flour. Other authorities, however, contend that whole wheaten flour has greater advantages over the flour that has been deprived of its mineral salts and cellulose. The following points in this respect are worthy of consideration:—

1. Whole wheaten flour bread has a greater sustaining power than bread made from white flour. It remains longer in the stomach.
2. It requires more mastication and therefore draws out the value of the saliva as a digestive fluid.
3. Its mineral properties act as a laxative—giving natural salts in proper proportions. In the case of people with sluggish intestines whole meal bread is preferable to white as it helps to maintain regular peristaltic action of the bowels and rightly takes the place of aperient medicines.
4. It supplies fat to those who cannot digest it in other forms.
5. It gives lime salts in districts where water and vegetables are deficient in lime—thus forming a suitable food for children and helping to prevent early decay of teeth.
6. Where meat and vegetables are lacking wheaten meal bread not only supplies the necessary bulk but gives the flesh-former as well as the requirements in the way of heat and energy to the body.

7. It is rich in Vitamins—those subtle elements which do so much to preserve health and encourage the growth of the body.

To obtain the best results from wheat it is advisable to grind a fresh amount every few days. This is of course only workable when small quantities are required—when a small coffee grinder can be utilised.

Whole wheat meal can be used instead of oatmeal for porridge. For thickening soups, stews, gravies and sauces it can be used instead of fine flour.

The following recipes for using whole wheat meal and also recipes for the use of bran might be appreciated by the housewife:—

Wheaten Loaf (without yeast).

1 cup of wheaten meal.
1 small teaspoon cream tartar.
½ teaspoon bi-carbonate of soda.
1 cup S. R. flour.
3 teaspoons treacle.
Milk.

Method:

1. Mix dry ingredients.
2. Dissolve treacle in little milk and add to mixture with sufficient milk to make a soft dough.
3. Pour into 2 greased tins (tall tins with lid).
4. Bake in hot oven ½ hour.

Whole Meal Bread (yeast).

1½ lbs. whole meal or ½ whole meal and ½ plain flour.
1 tablespoon brewer's yeast (1½ home made).
1 teaspoon salt.
¾ pint tepid water.
2 teaspoons sugar.

Method:

1. Sift and warm flour.
2. Mix yeast and sugar.
3. Add to flour and mix with tepid water and beat well.
4. Mark dough with a cross to allow the escape of CO_2. Leave in warm place until dough is twice the size.
5. Turn on to a floured board, add salt and knead until smooth and even.
6. Divide into loaves. Put in greased tins.
7. Put in a warm place. Allow to rise about 45 minutes, the surface should show small cracks or air bubbles.
8. Bake in a hot oven about an hour.

Wheat Meal Biscuits.

½ lb. flour.
½ lb. wheat meal.
6 ozs. butter.
2 eggs.
¼ lb. sugar.

½ teaspoon bi-carbonate soda.
1 teaspoon cream of tartar.
Little milk.

Method:

1. Put meal and sifted flour, cream of tartar and soda into basin.
2. Add butter and rub in with finger tips.
3. Add sugar then beaten egg and milk.
4. Turn on floured board, roll out thinly.
5. Stamp into rounds and bake a pale brown in a moderate oven.

Note.—Oatmeal may be used instead of wheat meal.

Bran Scones.

1 cup of flour.
2 cups of bran.
1 cup of milk.
1 egg.
1 teaspoon bi-carbonate soda.
¼ cup treacle.
1 or 2 tablespoons brown sugar.
1 or 2 ozs. butter.

Method:

1. Beat egg and sugar together.
2. Add treacle, melted butter and soda dissolved in milk.
3. Add flour and bran. Mix well.
4. Turn on to a floured board and roll out. Stamp in rounds.
5. Bake in moderately hot oven about ½ hour.

Bran Muffins.

1 cup wheat bran.
1 cup wheat meal.
1¼ cups milk.
(½ cup stoned raisins).
1 egg.
1 tablespoon sugar.
1 teaspoon salt.
1½ teaspoons baking powder.
2 tablespoons melted butter.

Method:

1. Mix dry ingredients (and raisins if used).
2. Add well beaten egg and melted butter and enough milk to mix to a stiff batter.
3. Bake in hot oven—in small patty pans or gem irons.
4. Note—1 or 2 tablespoons honey may be used instead of sugar.

Bran Biscuits.

1¼ cups S. R. flour.
2 cups bran.
¼ cup butter.
½ cup sugar.
1 egg.
Milk.

Method:

1. Cream, butter and sugar.
2. Add eggs and beat well.
3. Add flour and bran and mix in a little milk.
4. Turn on to board and knead.
5. Roll out and cut into rounds.
6. Put on a greased slide and bake in a moderate oven till light brown.

MARKET REPORT.

The following particulars of the approximate quantity of chaff available for auction at the metropolitan chaff and grain sales held in Perth during the months of June, July and August, also the minimum and maximum prices ruling for f.a.q. to prime wheaten, have been supplied by Messrs. H. J. Wigmore & Co., Ltd., of Wellington Street, Perth:—

June—Quantity, 1,100 tons.
Maximum price, £6.
Minimum price, £5 10s.

July—Quantity, 1,300 tons.
Maximum price, £7.
Minimum price, £6 5s.

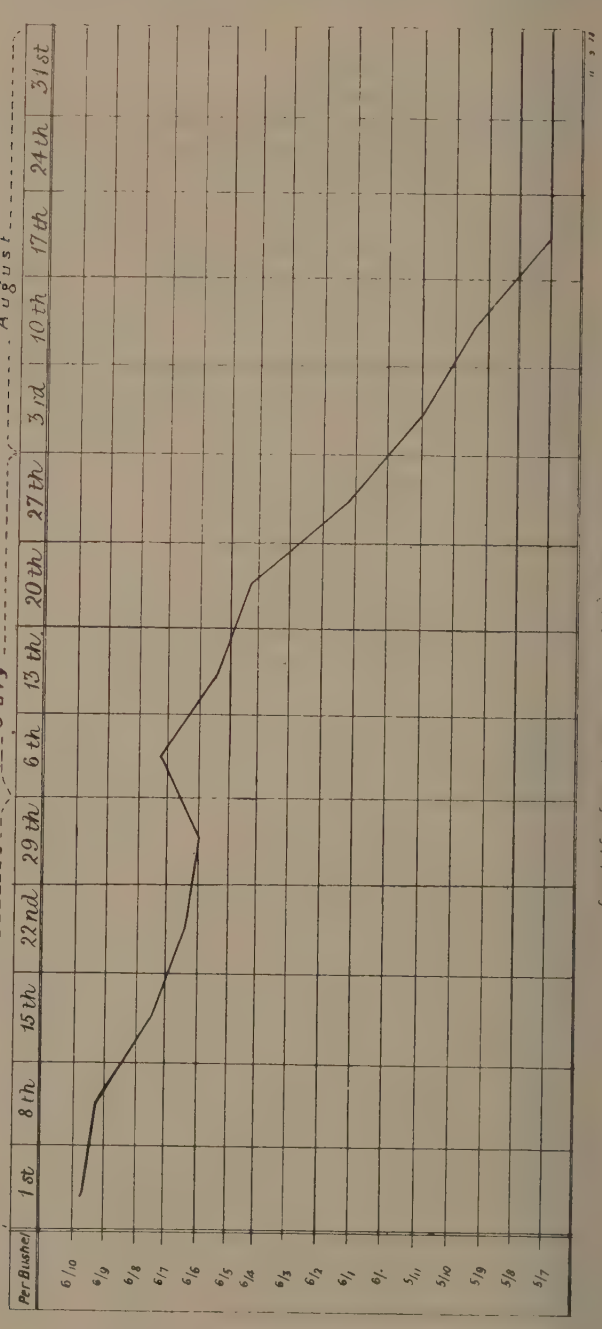
August—Quantity, 1,150 tons.
Maximum price, £6 12s. 6d.
Minimum price, £6 5s.

Owing to the extremely dry weather experienced in June and the late season natural feed was very backward, and in some districts almost non-existing, consequently practically throughout the farming areas all stock had to be hand-fed, resulting in an enormous consumption of hay and chaff. Under normal conditions quite a number of farmers would have had a surplus available for sale, but the same farmers were forced to purchase fodder to carry out their fallowing operations, etc. This placed the hay market in an entirely different position to that ruling when the last issue of this Journal went to press. It will be noticed that in July the maximum price was £7. This high price, to a large extent, was caused through stormy weather which prevented chaff-cutting, and immediately better weather prevailed the market eased somewhat. At time of going to press £6 10s. is being secured for f.a.q. to prime, but new season's hay will soon be available, and farmers having a surplus will be well advised to consign to auction.

Oaten Chaff.—Right throughout the period under review oaten has been in demand at prices equal, if not better, than those ruling for wheaten.

Oats.—When writing our last report the market stood at 4s. 6d. per bushel for good heavy feeds, since then it has eased slightly, but during the last few days very few supplies have been finding their way to market, and up to 4s. 9d. has been secured for consignments of exceptional quality, there being a steady demand for good heavy feeds at around 4s. 6d.

Wheat.—In sympathy with the overseas market local prices have depreciated considerably, f.a.q. selling during the last few days at auction at around 4s. 10d. per bushel, other qualities at lower prices according to sample.


Return of Wheat Prices Per Bushel
C. I. F. & E. London
June
July
August
Per Bushel
1st
8th
15th
22nd
29th
6th
13th
20th
27th
3rd
10th
17th
24th
31st
6/10
6/9
6/8
6/7
6/6
6/5
6/4
6/3
6/2
6/1
6/-
5/11
5/10
5/9
5/8
5/7
Compiled from figures kindly supplied by the Co-Operative Wheat Pool of W.A.

LIVE STOCK AND MEAT.

For the information of readers of the "Journal," the following particulars have been supplied by Messrs. Elder, Smith & Co., Limited, Perth:—

COMPARATIVE YARDINGS OF STOCK YARDED AT METROPOLITAN FAT STOCK MARKETS DURING MONTHS OF JUNE, JULY, AND AUGUST, 1928.

	JUNE.				JULY.				AUGUST.				
	6.	13.	20.	27.	4.	11.	18.	25.	1.	8.	15.	22.	29.
Sheep and Lambs	5,294	6,881	7,252	10,294	11,127	10,208	8,884	7,954	10,857	9,849	11,562	10,549	8,303
Cattle ...	756	955	773	644	629	905	703	469	746	932	743	756	573
Pigs ...	637	665	756	678	617	760	530	628	772	538	365	471	720

COMPARATIVE VALUES PER LB. OF STOCK SOLD AT METROPOLITAN FAT STOCK MARKETS DURING MONTHS OF JUNE, JULY, AND AUGUST, 1928.

	JUNE.				JULY.				AUGUST.				
	6.	13.	20.	27.	4.	11.	18.	25.	1.	8.	15.	22.	29
Mutton	13½	13½	13½	11	11	10½	10½	11	11	11½	11	11	10
Beef ...	8½	8½	8½	8½	8½	8½	8½	9½	9	10½	8	7¾	7
Pork ...	12½	12½	12½	12½	12½	12	12½	12½	12¼	12¼	12¾	13	13
Bacon ...	9½	9¾	9¾	9¾	9¾	9½	9½	9¾	9¾	10	10	10	10

METEOROLOGICAL INFORMATION.

STATIONS.	TEMPERATURE.				RAINFALL.		TEMPERATURE.				RAINFALL.		TEMPERATURE.				RAINFALL.	
	Maximum.		Minimum.		For Month.	Average.	Maximum.		Minimum.		For Month.	Average.	Maximum.		Minimum		For Month.	Average.
	Mean.	Highest.	Mean.	Lowest.			Mean.	Highest.	Mean.	Lowest.			Mean.	Highest.	Mean.	Lowest.		
	JUNE, 1928.						JULY, 1928.						AUGUST, 1928.					
					inches.	inches.					inches.	inches.					inches.	inches.
Chapman State Farm	67·8	75·3	48·2	39·9	2·62	4·14	66·2	75·7	45·6	37·5	6·03	3·97	67·6	75·5	45·9	40·1	2·43	2·72
Geraldton	70·5	78·6	53·1	44·6	4·63	4·68	67·6	74·6	52·3	39·0	4·32	3·91	69·1	75·4	53·5	45·0	1·72	2·93
Walebing	64·7	72·8	44·9	39·0	2·32	3·94	61·4	71·2	42·8	35·0	5·06	3·69	64·0	73·0	42·3	34·0	2·71	3·04
Perth	66·3	75·0	50·7	45·5	5·50	6·94	63·0	70·9	48·2	39·7	11·89	6·56	64·2	69·2	50·5	41·0	12·21	5·65
Kalamunda	64·1	71·3	49·9	41·0	6·01	8·05	63·5	68·3	46·7	39·2	13·07	8·05	63·6	67·8	48·3	40·9	11·67	6·74
Bunbury	64·4	69·0	48·5	42·0	4·88	7·17	61·6	68·4	47·6	37·0	6·80	6·99	63·4	67·8	51·1	38·2	5·75	5·39
Bridgetown	63·5	70·5	39·0	28·5	3·36	5·83	60·0	68·0	41·1	33·0	7·39	5·79	62·3	69·8	43·1	33·0	7·55	5·09
Albany	62·6	71·4	47·1	39·0	6·36	5·48	60·3	69·6	47·2	42·0	7·12	5·51	62·3	70·4	47·2	38·6	5·74	5·20
Merredin State Farm ...	62·8	71·9	45·0	37·0	1·07	1·83	59·5	71·6	41·8	29·6	2·24	1·92	64·2	71·3	42·0	32·6	1·54	1·39
Northam	65·3	73·0	44·4	35·2	1·46	3·29	62·8	72·0	41·9	32·8	6·73	3·38	64·9	72·0	43·8	35·0	2·60	2·57
York	65·3	72·8	43·2	32·2	1·31	3·36	62·0	73·0	41·1	31·0	7·30	3·34	64·5	72·0	44·2	35·0	2·93	2·82
Narrogin State Farm ...	61·1	69·3	42·8	35·7	1·78	3·70	58·2	65·7	41·0	30·0	6·93	4·09	60·5	69·7	43·1	32·7	4·43	3·17
Katanning	61·1	68·2	42·2	32·3	2·22	2·88	57·8	66·0	42·1	35·0	4·03	3·04	60·8	68·0	44·5	34·0	3·24	2·49
Cape Leeuwin ...	63·9	69·8	54·2	47·5	4·92	6·88	61·0	72·2	52·9	45·0	10·19	7·13	61·5	66·0	52·7	43·8	6·99	5·23

PRODUCERS' MARKET REPORT.

The Producers' Markets Ltd. report as under for the quarter ended 31st August, 1928.

FRUIT.

Supplies of fruit were short early in the period, values on the whole being very firm. Apples, owing to the short crop, were in keen demand, many inquiries being received for varieties suitable for long storage. Very little selling between grower and buyer was noticed, as growers were content to cool store on their own behalf and market accordingly. This has had a great influence on the market throughout the period. Efforts have been made by those controlling the cool stores to keep a regulated supply and this has proved successful to date. With the drawing of apples from cool stores in July, supplies increased but values remained high holding up to expectations and this continued throughout the three months.

Navel oranges of prime quality commenced firm although weather conditions were against this fruit and, with the supplies increasing, values for falls and thick skinned varieties became easier although prime fruit sold at steady rates. To date values show a big improvement on the previous season's crop, mainly owing to the fruit being of a better quality less percentage of falls in comparison with the previous season, when falls were numerous.

Local tomatoes were about finished at the end of July, their place being taken by the first of the Geraldton crop. This crop was slow in coming forward and values commenced high as against the previous season when values were low at the commencement. At the end of August, supplies were plentiful, values being steady.

Passion fruit have been short throughout the period and high values obtained for any quality fruit.

Lemons, as is only to be expected at this period of the year, have been low in values but with the improvement in weather conditions values should firm.

The mandarin crop was good, values for prime lines firm, but supplies on the whole have consisted of small fruit. Towards the end of August a few cases of loquats were noticed, this fruit being mostly small and dry.

On the whole, values for the period have been firm and should compensate the grower to some extent for the short crop.

VEGETABLES.

Supplies of vegetables were moderate early in the period and values were easy. In June we were still offering lines of last season's produce, namely—potatoes, swedes and beans. Later in the month new seasons peas and beans were submitted from the Geraldton district and values firmed considerably. Supplies have been regular all the time and prices reached as high as 1/7½ per lb. Towards the end of the quarter the volume increased and values receded to 7¼d. for prime samples. Potatoes have been moderately supplied and the demand good for prime samples of

matured potatoes. Second grades were selling well early in the period but have little value just now, owing, no doubt, to the low price ruling for the imported article. New-dug metropolitan potatoes have been on the market during most of the quarter and early lots were from small sheltered plots and realised high prices. These have since eased in quantity and values are holding well. New-dug lines have been coming forward during the latter part of the period from the Balingup district. These are prime samples and values have been firm, especially for those lines from growers who grade and wash them.

Cabbages were heavily supplied during June and July and values were steady. First grade lines were in demand, and some prime lines were offered from the Spearwood district. Some very prime lines were forward from the country, among which was a splendid crop from Lennox. A big proportion of the cabbage sent to auction from the country is much too large and not tightly packed in the bags. Consequently values suffer and the grower is dissatisfied.

Pumpkin supplies were heavy during the early part of the period and values were steady. A lot of inferior quality were being marketed. These were hard to quit and had the tendency to lower the price of the prime lines. Supplies have been shorter during the last month and values have firmed. Prime *Triumble* of good size and colour is in demand also Prime *Queensland Crinkliss.*

Cauliflowers were only moderately supplied during the first two months and the quality was poor. First grade lines were firm on account of this. Other grades easy. The supply was heavier earlier in August but fell away sharply toward the end of the month, owing no doubt to excessive water in the gardens. Country lines were a failure early in the quarter but some prime lines are being submitted now and values for these are good.

Swedes were heavily supplied during June and values were low. These soon cut out though, and supplies have been scarce and the demand very keen for any lines approaching prime quality. Growers are also advised to pay particular attention to the preparing of swedes for market and to grade carefully.

Rhubarb supplies have been plentiful all the quarter and values have been steady, the demand being good, owing to a short supply of apples for cooking. Bunch roots were heavily supplied during the quarter and the demand keen for prime lines. Carrots and parsnips were firm all through. Beetroot and turnips were dear in the earlier part of the period but during August these two lines eased considerably. Lettuce has been short supplied during the whole of the quarter and values have been firm. The demand is still good for prime lines.

WESTERN AUSTRALIA—DEPARTMENT OF AGRICULTURE.

List of Bulletins available for Distribution.

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No. 79.—*Sheep on the Wheat Farm and their Management in W.A.* By H. McCallum. Free.
No. 83.—*Horticulture and Viticulture.* By A. Despeissis. Price 2s.
No. 87.—*Sheep Feeding Experiments: State Farm, Chapman, 1920.* By G. L. Sutton and F. Vanzetti. Free.
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No. 115.—*The Value of Windmills for Pumping Water in W.A.* A. H. Scott.
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No. 118.—*Pigs and Pig Raising.* P. G. Hampshire.
No. 119.—*Take-all of Wheat and Similar Diseases of Cereals.* By W. M. Carne and J. G. C. Campbell.
No. 120.—*Pastures in the South-West.* A. B. Adams. (Reprint from "Journal.")
No. 121.—*Mildew, Septoria, Leaf Spots, and Similar Diseases of Cereals.* W. M. Carne and J. G. C. Campbell.
No. 122.—*Fruit Fly. Description and Control.* L. J. Newman.
No. 124.—*Government Inspection of Wheat.* G. K. Baron-Hay. (Reprint from "Journal."
No. 125.—*Buy Good Seed.* (Advice to Farmers.) W. M. Carne. (Reprint from "Journal.")
No. 126.—*The Rust of Cereals.* W. M. Carne and J. G. C. Campbell.
No. 127.—*Wheat Yields—Competitions.*
No. 128.—*Woolly Aphis Parasite (Aphelinus mali).* (Hald.) L. J. Newman. (Reprint from "Journal.")
No. 129.—*The Farm Horse: Hints on Feeding.* A. McK. Clark. (Reprint from "Journal")
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